Building Underdeveloped Sensorimotor Systems to Support Children's Bodily and Emotional Regulation to Enable them to Better Participate in Relationships and Learning at School

1. Review of the National Primary School Curriculum: IFCA's Views on Opportunities Offered by the BUSS Model:

1.1. IFCA welcomed to opportunity to have foster carers meet with Maria Kelly and Liam Clohessy from the NCCA at a recent focus group for foster carers in the Ashling Hotel on 29th May last to give their views on the Wellbeing (SPHE including PE), Arts Education, Modern Foreign Languages, Social and Environmental Education, and the Science, Technology and Engineering curriculums.

1.2. We believe that the BUSS Model has much to offer in terms of how to understand and respond to children's bodily and emotional regulation needs and how these areas of a child's development interact and impact on their capacity to engage in relationships and learning in the school context. Using the building of children's foundation sensorimotor systems as a basis for the Wellbeing curriculum, especially in young children in primary school, appears to offer a solid foundation on which all children can develop and thrive, not just children at risk and children in care.

1.3. We welcome the opportunity to outline IFCA's engagement with the BUSS Model and why we would encourage the NCCA to explore the model further in terms of how it can inform how we can equip children to have the best possible start in primary school and how

attending to and supporting the developmental of their bodily and emotional regulation will enable them to participate better in relationships and learning in school.

1.4. Our submission to you below outlines:

- IFCA's interest in, and involvement with the BUSS Model;
- The basis of the BUSS Model;
- How the BUSS Model can help vulnerable children;
- The vestibular, proprioceptive and tactile systems and how they underpin children's movement, play, emotional regulation, relationships and learning;
- The BUSS Model, school readiness and education;
- BUSS in Education Early Years Work;
- Relevant references and resources.

2. **IFCA's interest in, and involvement with, the BUSS Model:**

2.1. IFCA is currently running a pilot project in collaboration with BUSS UK and Tusla delivering BUSS LEAPlets groupwork to children who have experienced developmental trauma and their foster carers. There are 4 pilot sites around the country where LEAPlets groupwork is taking place: Galway, Dublin, Meath and South Tipperary. This is the first time BUSS LEAPlets has been available to children in care in Ireland. The project is funded by the RTE Toy Show Appeal.

2.2. The project is being evaluated by researchers from the School of Social Work and Social Policy in TCD and TUS Shannon. The evaluation is being funded by the DCEDIY's What Works Building Evidence Fund and will conclude with the final report available in the spring of 2025.

2.3. IFCA recognises the challenges faced by children in care whose early experiences of trauma have impacted on many aspects of their development and on their capacities to engage to their fullest potential in school.

2.4. The BUSS Model grew out of the work of Sarah Lloyd (Specialist Occupational Therapist and Author of the BUSS Model) in Fife CAMHS during 2005 to 2013 as part of a team developing a therapeutic service for local children in foster care. The team were offering traditional psychological therapies and became aware of a significant group of children who were not able to make use of these, who were seemingly as dysregulated on a bodily level as on an emotional/relational level. Sarah and her colleagues in BUSS worked to understand more about how children grow into themselves on a bodily level and why this process halted for children who had experienced early adversity.

2.5. Research by the Central Statistics Office highlights educational outcomes for children in care in Ireland with children in care more than 3 times more likely than the general population to not complete education to Leaving Certificate level. They are 3 times more likely to have to repeat a school year. They miss more days at school than their peers who are not in care (Educational Attendance and Attainment of Children in Care, 2018 – 2023 CSO, 2023).

2.6. Poor sensorimotor functioning negatively affects children's social and emotional development and their participation in school. Research shows that children who have early adverse experiences show lower IQ, academic underachievement, and deficits in different neurocognitive areas like attention, language, memory, and executive functions (De Bellis, Woolley, & Hooper, 2013; Font & Berger, 2015). Such experiences also affect brain areas associated with motor development (Perry, 2008).

2.7. If children in care can be supported early on to build their sensorimotor systems and emotional regulation, they will be better equipped to socialise, play and learn with potential positive outcomes on the quality of their relationships and their educational attainment over the long term.

2.8. Physical activity can improve children's ability to pay attention in class (Ratey & Hagerman, 2008). Self-regulation skills developed through physical activity free them up for learning (Williams & Shellenberger, 1994; Sandford, Duncombe, Mason & Butler, 2015) and reduces points of stress in the school day (Ayres, 1989).

2.9. BUSS UK have carried out a range of research to address the evidence base around the BUSS Model. Sarah has published 2 books: Improving Sensory Processing in Traumatised Children (2016) and Building Sensorimotor Systems in Children with Developmental Trauma (2020). Other research on the benefits of BUSS include work by Harriet Haslam (2020), Katherine Grindheim, (2019), Chloe Robinson (2021), Natalie Jones (2021) and Danielle Smith (2022). Findings include positive outcomes for children in terms of relationships (e.g. greater enjoyment and participation in family life, greater self-belief, increased bodily and emotional regulation), social interactions (feeling part of something, increased curiosity about the world), language and cognition (e.g. improved language and expressive skills, improved memory and attention) and physical benefits (e.g. strengthening body and catching up with peers). See www.bussmodel.org.

2.10. IFCA's BUSS LEAPlets Early Intervention pilot project aims to promote the development of children's sensorimotor and emotional regulation skills, enhance the understanding of foster carers and Social Workers about the sensorimotor and emotional regulation needs of children who have had adverse early life experiences, and promote better responses to these children so that the gaps in these areas of their development can be revisited and addressed. It aims to support stronger, more attuned relationships with their caregivers and experience better transitions in to primary school. The BUSS Model builds carers' confidence and capacities to

respond in ways that promote essential skills in the child to enable him to better take part in relationships, play and learning and so to have a better experience of school life.

2.11. In line with a range of government policies and strategies, including 'Young Ireland: the National Policy Framework for Children and Young People', this project builds shared understanding and common language among foster carers and social workers around impact of early adverse experiences on bodily and emotional regulation and foundation sensorimotor systems and appropriate responses to same.

3. **The Basis of the BUSS Model:**

3.1. Babies are born entirely dependent on the care of others for their survival, both physically and emotionally, and this underpins the vulnerability of the child's experience. With consistent, loving care the potential of the developing child seems infinite while conversely the consequences of abuse and neglect can seem catastrophic.

3.2. The emphasis of a lot of work with children with developmental trauma is currently on their emotional and psychological wellbeing; harnessing relationships to lay down new experiences alongside their early ones.

3.3. Sarah Lloyd, Specialist Occupational Therapist and author of the BUSS Model, was working in Fife CAMHS (2005 – 2013) as part of a team developing a therapeutic service for local children who were looked after. The team were offering traditional psychological therapies and became aware of a significant group of children who weren't able to make use of these, who were seemingly as dysregulated on a bodily level as on an emotional / relational level.

3.4. Wanting to understand more about how children grow into themselves on a bodily level and why this process halted for children who had experienced early adversity, Sarah turned to sensory integration. Sensory integration theory helpfully mapped out how the brain and central nervous system develop in response to movement, but there was very little mention of the relationships and conditions necessary for babies to thrive. Similarly, in the attachment and trauma literature there was a relative dearth of information about the process by which children grow into themselves on a bodily level.

3.5. A solution seemed to be to build a model that could bring together an understanding of the body and motor development with our psychological understanding of the impact of trauma on the developing child. The result is the BUSS® (Building Underdeveloped Sensorimotor Systems) model which brings together an understanding of how a baby and young child's sense of themselves on a bodily level develops through experiences of being touched, held and of moving, all within the context of nurturing relationships. Sitting alongside a neurodevelopmental understanding of the impact of trauma on the developing brain, attachment theory, child development theory and drawing on sensory integration theory, the model focuses on the development of the vestibular, proprioceptive and tactile systems.

3.6. BUSS® takes as its starting point the understanding that without nurturing relationships babies don't progress through the stages of movement that are needed to feed the brain and central nervous system with enough information to build an internal map of the body and lay the foundation for well-coordinated movement. Clinical experience suggests that these systems aren't broken in the way that might be seen in children with sensory processing disorders, rather they are underdeveloped because of a lack of adequate movement experiences at critical stages of development. BUSS® explores potential for rebuilding gaps in these systems left by early adversity, using games and activities within relationships that offer the child a loving, attuned base to grow from.

4. How Can the BUSS Model Help?

4.1. Playing games and doing activities designed to fill in gaps in essential patterns of movement, missed in infancy and early childhood, within these loving relationships has a significant effect on a child's bodily regulation. It allows children to feel confident in their movements and the messages their body gives them about their physiological state, providing a solid foundation for the development of social and emotional skills and learning.

4.2. Improved bodily regulation has a significant impact on children's emotional wellbeing and regulation, and parents talk about how much better their relationship with their child becomes as they help their child to feel more comfortable in themselves on a bodily level. Other parents talk about how much less angry their children become and it's interesting to think how frustrating it must be for children who have to fight against their bodies to move around and do things. The amount of energy and effort that this takes is phenomenal, and what is wonderful to know is, as children grow into themselves on a bodily level, how much more energy and capacity they have. The fact that babies are born entirely dependent on the care of others for their survival, both physically and emotionally, underpins the vulnerability of the child's experience. With consistent, loving care the potential of the developing child seems infinite while conversely the consequences of abuse and neglect can seem catastrophic. The emphasis of a lot of work with children with developmental trauma is currently on their emotional and psychological wellbeing; harnessing relationships to lay down new experiences alongside their early ones.

4.3. This is different to work with children who have a sensory processing disorder. Although a child with an underdeveloped system may move in a similar way to a child with a sensory processing disorder, they're actually completely different. For a child who has experienced abuse and neglect, it's usually the case that the system isn't broken, it just hasn't been built yet.

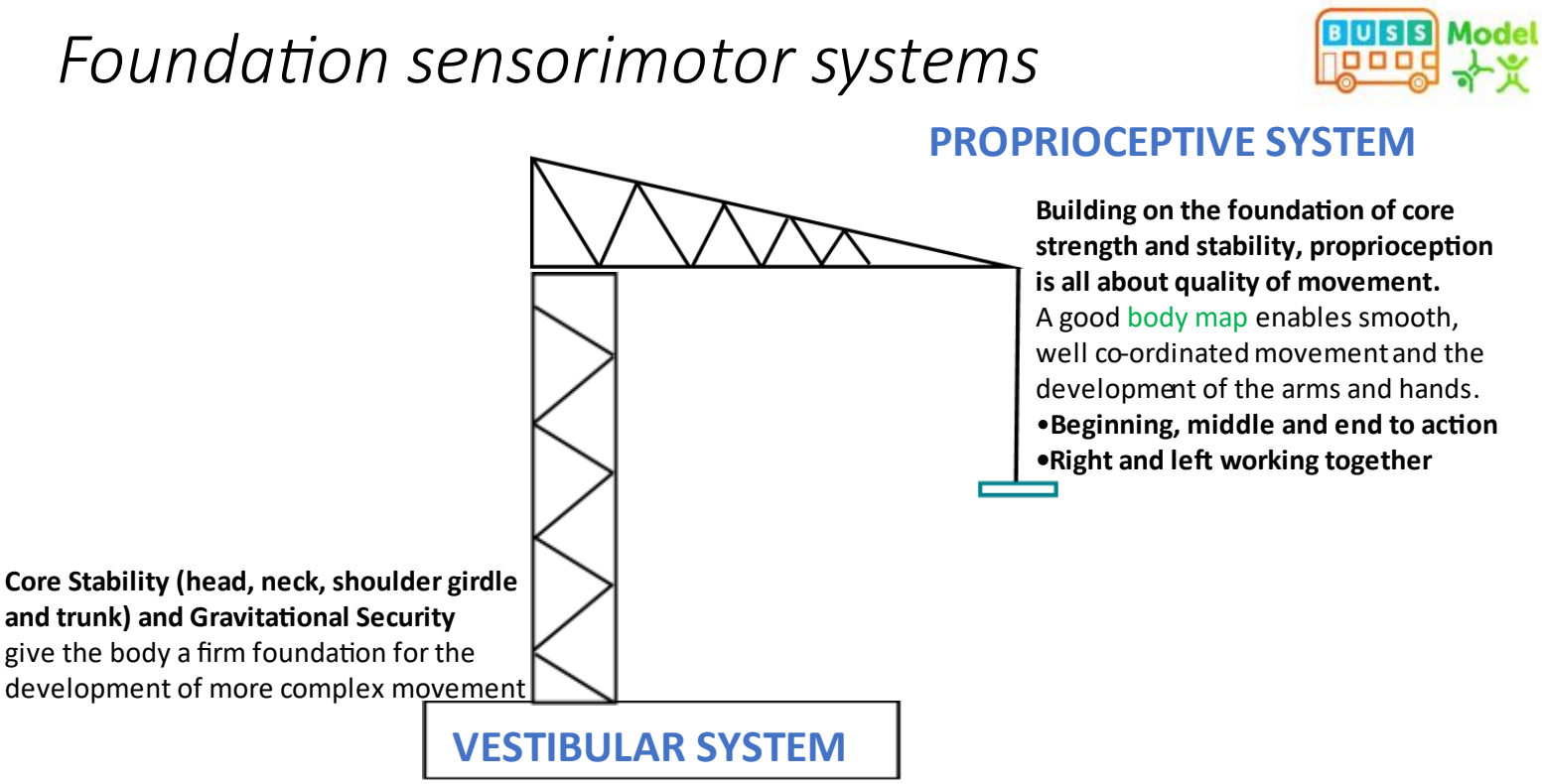
5. When it might be useful to bring a BUSS® lens into education settings:

5.1. When children start school and are functioning at age expected norms, then the structure of the curriculum should support their ongoing growth, education and development. Where there has been disruption to a child's early development, for whatever reason (e.g. prematurity, hospital admissions, neglect, trauma) this might not be the case. For these children, it can be helpful to look at the pre-requisite skills of school readiness (Development Matters (https://www.gov.uk/government/publications/development-matters--2), through the lens of foundation sensorimotor systems, understanding the role that bodily regulation plays in the development of the child. Foundation sensorimotor skills start developing at conception, as the baby moves in utero. Once the baby is born, predictable, loving care, allows these systems to grow through touch, being held and carried, movement and play. It is this delicate synthesis of nurture, touch and movement that it can be useful to appreciate when trying to understand the impact that disruption of this process has on a child's future development.

5.2. Notwithstanding the fact that there is a critical period for the development of these systems, the live wiring of the brain (Eagleman, 2001) gives the opportunity to fill in gaps and further develop these skills within the nurturing relationships that trauma informed school can offer. Building good bodily regulation gives a child a platform for the development of more complex skills, like understanding and managing feelings, making and keeping friends, and learning. This document aims to give information about this, but BUSS® is an accredited training and further training is required to use this model (www.bussmodel.org/training).

6. School Readiness

6.1. Development is a sequential process, with each stage of development building a platform for the next stage. In BUSS® we use the analogy of a crane – without a stable base, the crane won't be able to do its work. It's just the same on a bodily level –



6.2. Alongside this, the tactile system needs lots of good experiences of touch and nurture to develop from the state of high arousal in the young baby, to an internalised sense of the world as a safe, predictable place. It's this shift from defensive to discriminative function that allows a young child to make sense of information that's coming from the outside world, (e.g sounds, tastes, smells) without over or under responding to that information.

When these foundation sensorimotor systems haven't had the kind of early experiences they need to develop, their development can be compromised.

Vestibular System –

Core stability

If a child's body isn't getting the strength and stability it needs from head, neck, shoulder girdle and trunk, then everything is challenging,

- sitting,
- standing and
- walking to
- more complex movements – like writing or cutlery that happen far away from the core,
- or movement that requires more co-ordination, like running or jumping

Gravitational Security

Without a sense of wellbeing when they're moving, children will tend to do either –

- Moving quickly – speed making up for a lack of or feeling of control /
- Try to keep their feet quite close to the ground – perhaps avoiding activities like trampolining or scooting, or going down escalators

Proprioceptive System

Movements are poorly modulated- too floppy or jerky

Without a good body map, the child needs to use their eyes to know where their body is

Over- or under-shooting movement – too much / little pressure or force

Lots of tripping, bumping, crashing

Lots of fidgeting and moving – seeking input to keep track of their body

Tactile System – making sense of information from outside the body

Under responding to information

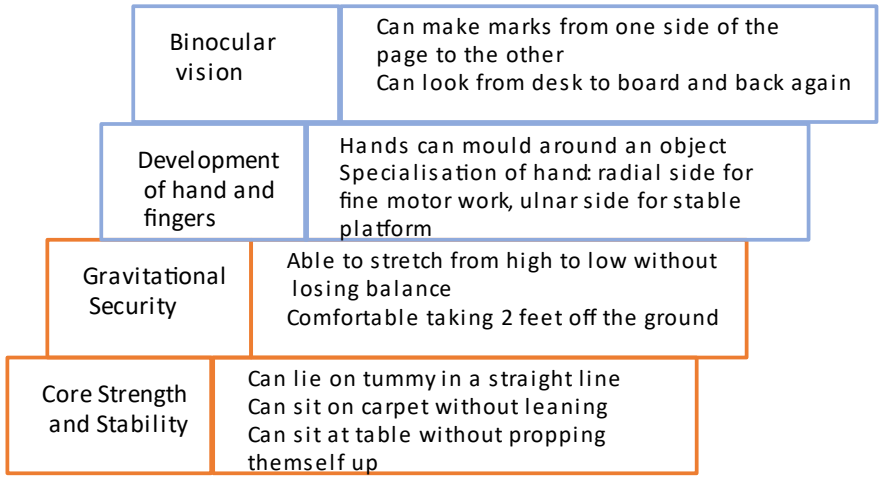
We might see children falling and hurting themselves but not registering the pain., not able to discern when they're hungry, not noticing that they're getting too hot or cold so not making any normal adjustments, like taking off / putting on a coat.

Over responding to information

Being really startled by noise, so that they're not able to keep working the way the rest of the class can. Or they might experience light touch as really intrusive – so someone brushing past them provokes a bigger response that you'd expect. Or constantly in a state of high alert / vigilence

6.3. **Learning Outcomes -** It can be useful to look at learning outcomes through a BUSS® lens, thinking about the ideas of sequential nature of development and pre-requisite skills – here's a brief illustration and a more detailed view:-

Stepped progression to Learning Outcomes – I can write a letter - brief version –



Then a more in depth view -

Alongside all of this, the tactile system needs lots of good touch and nurture experiences to evolve from a state of high alert, to the young child internalising a sense of the world as a safe place. These experiences allow this system to shift from the state of high arousal, to being in the moment of an experience, which is necessary to be able to learn and retain information. This process happens on a bodily and an emotional level.	**Able to stay connected to a thinking part of the brain**	Is able to sit close to another child without feeling intruded upon by that child Can manage the buzz of a classroom and stay connected with a thinking part of their brain, rather than being in a state of high alert
Again, crawling is the stage of development that supports the development of the visual field	**Binocular vision and depth perception**	Child is able to make marks from one side of the page to the other and look from their desk to the board and back again
Crawling is the stage of development that allows this to develop -that foundation of core strength means that the babies head, neck and trunk can stay still as they move, allowing the arms and legs to work in an integrated way together. **The baby arms are straight and their hands flat and facing forward, which is important for these 3 processes of hand development**	**Development of the hand and fingers – 3 really important processes here**	1. Weight bearing on the flat hand supports the development of the bones at the base of the hand, which is what allows the child to mould their hand around an object, so that they can catch a ball, or carry an egg, or hold something in the palm of their hand. This is what enables the young child to move from a palmar grasp to being able to involve their fingers in the action. **2.** This position supports specialisation of the hand - the radial side (thumb, index and middle finger) do the fine motor work (like holding a pencil or using cutlery) while the ulnar side (ring and little finger) provide stable platform for the hand to carry out the fine motor tasks
Vestibular system	**Development of gravitational security -** Lots of experiences of the baby being held and carried by attuned carers support the development of this system.	We see the child is able to stretch from high (with their arms above their head, to touching the floor, without losing balance Is comfortable moving around, climbing and jumping with 2 feet for take off and landing

Vestibular system – this system begins to develop at conception	**Good core strength and stability – a baby develops from the head down – beginning with head control, then neck, shoulders and trunk. Development then goes from proximal (close to the body) to distal (further away from the core). With lots of touch, nurture and movement experiences, like lying on their tummy, rolling, commando crawling, sitting unsupported and crawling, we should see development progressing from head, neck, shoulders and trunk to arm and hand development before a baby is standing and walking.**	Can lie in a straight line on tummy without supporting head Can sit it on bottom with legs out in front without using arms to prop Can move arms while standing without losing balance Is able to sit up at a table, without the need to prop themselves on their hands/arms Can sit on the carpet without leaning, or sliding off their chair Can listen effectively when sitting	

7. The BUSS Model, School Readiness and Education:

7.1. BUSS UK uses the BUSS Model work with schools to think about the implications of underdeveloped sensorimotor systems on a child's journey through education. They run in service training sessions and work with schools in building their expertise in supporting children who have experienced developmental trauma.

7.2. There are many things can contribute a child not having the kind of early experiences that facilitate the stepped progression through predictable stages of motor and emotional development that allow children to progress towards emotional regulation and learning. Not progressing through these stages of development at the right time can impact later stages of development.

7.3. BUSS® began as a clinical intervention, recognising the importance of addressing gaps in early development before / alongside consideration of relational or psychological therapies. Within education settings, there is growing understanding that, without successfully negotiating early stages of development, it's much harder for children to engage with and succeed in education. At the moment, the focus of the BUSS® in Education work is on an early years programme– working with children from nursery through to the end of key stage one(equivalent Irish primary school years junior and senior infants and first class). The programme can be run with children and their parents/carers on a 1:1 basis or as a small group. The BUSS Model can also be used to support schools to work with older children using BUSS® on an individual basis.

7.4. Training in BUSS® for schools is designed to build on trauma informed practice. If BUSS® is the starting point for a school, training can be adapted to include an understanding of the impact of trauma on the developing brain and implications for education.

7.5. It can be helpful, if a school is considering either the BUSS® in Early Years Groupwork Programme or being supported to use BUSS® with an individual child, to have a whole school twilight training. This 1.5-hour session introduces the school team to BUSS®, building understanding of the role of the earliest relationships in a child's life in establishing a foundation of bodily regulation. Good bodily regulation (a child having enough core stability to be able to sit on a chair or the carpet, feel confident when they're moving and able to do things like jump with both feet off the ground) and these forms the foundation for the development of more complex motor skills (like being able to write or focus on what is being taught rather than having to concentrate on sitting or not falling over). This platform of good bodily regulation allows children to begin to be able to manage friendships and emotional regulation, both of which are steps towards learning and cognitive tasks.

7.6. The training supports staff to consider children in their setting, thinking about their foundation sensorimotor systems and how this impacts their capacity to function in school. It can be delivered in person for schools local to us, or remotely.

7.7. Sarah Lloyd is currently liaising with a primary school in Ireland who are eager to have staff training in BUSS to support the children's development and learning in their school. The progress of this individual school project may be helpful in informing the work of the NCCA curriculum review.

8. BUSS® In Education Early Years Group Work:

8.1. This 12-week groupwork programme is for children aged from 3 – 6 years and their parents or carers. BUSS® is most beneficial in settings where there is already an existing culture of trauma-informed training and practice, where experienced educators are working alongside children and their families where there has been some disruption to the earliest development of the child.

8.2. Working with parents or carers, the weekly group focuses on building bodily and emotional regulation. Parents and carers are encouraged to do the activities from the group at home, and school staff can supplement the work of the group in sessions within school.

8.3. BUSS UK can support schools to run these groups, building the skills and expertise of staff through training and supervision as the group progresses. At least one teacher must be BUSS® Level One trained and then have completed a BUSS® in Education Groupwork training. Most settings choose to have at least 2 members of the team trained at BUSS® level one. Some schools have involved other key staff in the training and delivery of BUSS in the schools including the special education needs coordinators, resource teachers, etc.

8.4. Supervision has long been an integral part of clinical practice and its value is increasingly being recognised in education. There are 4 sessions of supervision embedded within the 12-week groupwork programme. These give the opportunity to discuss the progress of children in the group, build understanding of their developing foundation sensorimotor systems and think about grading and differentiation of activities within the group.

8.5. To learn more about the BUSS in Education work at Grimes Dyke Primary School in Leeds and Sarah Lloyd's NHS work, commissioned by Jane Mischenko, Children's Commissioner, in setting up a partnership with Leeds Virtual School and Meadowfield Primary School in Leeds to work with children who are looked after before they start school, visit: https://bussmodel.org/buss-in-education/

9. Other References and Resources:

- www.bussmodel.org
- LEAPlets – the BUSS® in Early Years Group, developed by Sarah Lloyd, Consultant Occupational Therapist and Play Therapist
- Sarah Lloyd talking about using the BUSS Model in a groupwork context with young children aged 3 to 6 years: https://youtu.be/zk71v6E-5j8
- Example of a sensorimotor circuit in a primary school setting: https://youtu.be/DxdrYh0Md6s
- For information about research projects on the BUSS Model: https://bussmodel.org/resources-and-research/
- Lloyd, S. (2016). Improving Sensory Processing in Traumatised Children. JKP
- Lloyd, S. (2020). Building Foundation Sensorimotor Systems in Children with Developmental Trauma. A Model for Practise. JKP
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- Koscinski, C. (2017). Sensorimotor Interventions. Using Movement to Improve Overall Body Function. Sensory World.
- Young, E. (2021). Supersenses. The Science of your 32 Senses and how to use them. John Murray Publications

For more information on the BUSS Model, contact Sarah Lloyd at sarah.lloyd@bussmodel.org

For information about BUSS training, please contact Vicky.holland@bussmodel.org

For further information on IFCA's BUSS Early Intervention Project, contact Katherine O'Daly at katherine.odaly@ifca.ie

Irish Foster Care Association