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SENSE-ational Schools: Physical Literacy Enriched Movement Opportunities for Students with Neurodiversity

Greg Bennett, Saskatoon Public Schools
Blair Ross, Saskatoon Public Schools
Natalie Houser, University of Saskatchewan
Louise Humbert, University of Saskatchewan
Any Jackson, University of Saskatchewan

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Research Coordinator

Dr. Stirling McDowell Foundation

2317 Arlington Avenue

Saskatoon SK S7J 2H8

Telephone: 1-800-667-7762 or 306-373-1660

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Background

There is an increasing range of neurodiverse needs and complexities within the school context, and despite the growing awareness, many schools still struggle to implement inclusive practices, and even more so in school movement spaces (e.g., physical education, recess, before/after school, etc.). Neurodiversity recognizes differences in brain function and behaviour as natural variations within the human population (Fung & Doyle, 2021). Individuals whose minds function differently from dominant societal norms are identified as neurodivergent (Walker, 2021).

As a result, students with neurodiverse needs often do not have the same opportunities for being successful in school and movement. Research shows that many children with disabilities and neurodiverse needs rely on school as a primary source for physical activity and resources to support their needs, making schools a critical site for promoting inclusive movement opportunities to further promote health and well-being (CDC, 2020; Huynh et al., 2024).

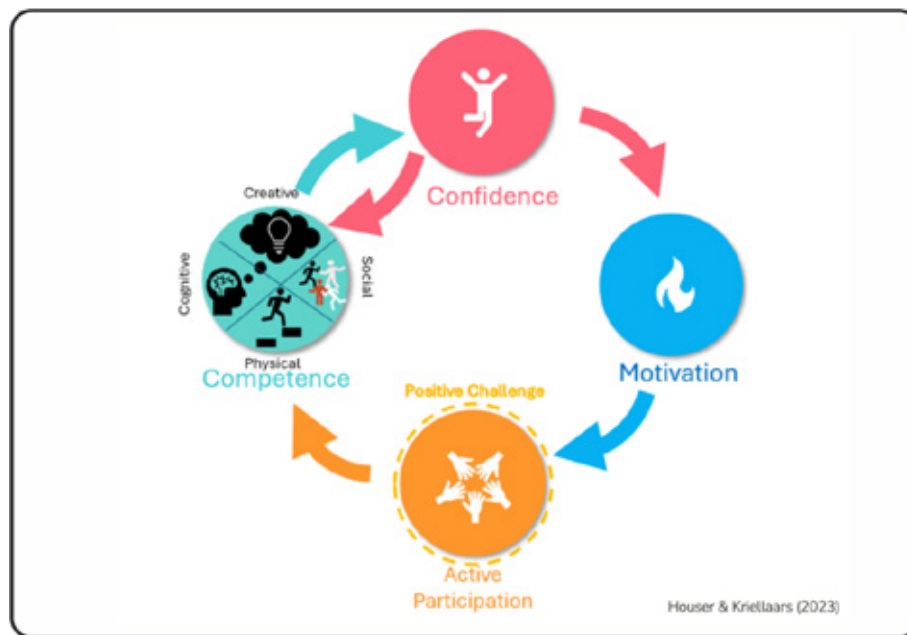
Creating inclusive movement environments where all students feel welcomed, supported, and able to participate meaningfully can foster a sense of belonging, enhance engagement, promote positive social interactions, and provide opportunities for students to develop physical literacy and lifelong engagement in physical literacy (Houser et al., 2024; Houser & Kriellaars, 2023).

Physical education is a required area of study in the K-9 curriculum and provides valuable opportunities for students to gain knowledge about how to be physically active, develop positive relationships with peers and skills such as confidence, competence, and motivation, which are important components of physical literacy (Houser & Kriellaars, 2023). With this, PE can be an opportunity to provide students a variety of movement experiences, facilitating the exploration of their movement interests and finding the ones that resonate most with them. It is well-recognized that experiences in PE can influence physical activity participation within and beyond the school day, so supporting the holistic skill development and positive experiences for students of all abilities is critical for continued participation in movement, but many barriers currently exist.

PE instructional spaces can often be overstimulating for students with neurodiversity, (such as noise, lights, number of people) (Villa-de Gregorio et al., 2023). The sensory demands of gymnasiums, including loud and unpredictable sounds, bright lights, frequent transitions, crowded environments, and multiple stimuli competing for attention,

may create barriers to participation. When students' unique sensory, communication, and learning needs are considered and barriers are reduced, movement can support confidence, competence, and motivation, which are key components of physical literacy (Houser & Kriellaars, 2023; Tremblay et al., 2018). Although there are complexities associated with participation, meaningful and inclusive movement experiences can help students build competence and confidence in physical activity, building the foundation for the development of physical literacy and lifelong engagement in movement.

Physical literacy can be defined as “the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engagement in physical activities for life” (Tremblay et al., 2018, p. 1) and is a way to support the holistic and individualized development of all students regardless of their ability (Belanger et al., 2018; Houser & Kriellaars, 2023.) Physical literacy is a guiding construct in the Saskatchewan PE curriculum, with an effective PE program being described as one that supports physical literacy development (Saskatchewan Ministry of Education, 2010). The physical literacy cycle (as shown below) includes the concurrent development of competence (physical, cognitive, creative, social) and confidence, which leads to greater motivation to participate through active challenge (Houser & Kriellaars, 2023).



Using physical literacy as a guide to enriching PE and school movement spaces can make opportunities more inclusive for students with neurodiversity, so they can participate fully alongside their peers. For example, offering choice in equipment (e.g., type/size of ball) can allow for students with a range of abilities (including those with neurodiversity) to find the equipment that best suits their needs, and demonstrates there is not just one right way to participate. These adaptations can support competence development while concurrently fostering confidence, motivation, and enjoyment of movement, allowing students with neurodiversity to thrive in PE alongside their peers. Aligned with UNESCO's concept of Quality Physical Education, a physical literacy approach emphasizes meaningful, inclusive, and student-centred movement experiences for all learners. The

outcome of QPE is a physically literate individual who has the skills, confidence, and understanding to continue participation in physical activity throughout their life-course (McLennan & Thompson, 2015), which is a worthy aspiration.

Quality and enriched school movement spaces provide students with opportunities for choice, autonomy, skill development, and positive social interactions, all of which contribute to lifelong engagement in physical activity. Movement experiences in school can help students develop authentic connections, fostering relatedness and leading to feelings of belonging, empathy for others, and a desire to participate. Authentic inclusive movement participation has benefits to all students and as such contributes to the development of empathy and respect, which impact the school culture as a whole. Recognizing the challenge but also the potential of inclusive movement spaces, this project intended to equip teachers with the pedagogical tools and skills to support instruction that creates barrier-free participation for students with neurodiversity. By using physical literacy as a guiding principle in this work, teachers can create supportive movement environments that recognize and value diverse strengths, needs, and ways of participating, ultimately fostering greater inclusion, engagement, and well-being for all students.

Purpose

The objective of this project was to work with teachers and educational assistants to create physical literacy enriched school movement experiences suitable to children with neurodiversity and their peers, and to enhance the staff cohesiveness across contexts to maximize the benefits for students. Many of the stimuli that create aversion to movement participation in students with neurodiversity are intentionally removed from “sensory spaces,” but these stimuli are often still present as barriers in movement spaces and gymnasiums. We explored how modifying the environment with suitable equipment and pedagogical practices influenced students with neurodiverse backgrounds, using a physical literacy approach. Additionally, this project explored how changes in instructional strategies and equipment influenced school staff roles in supporting inclusive movement opportunities for students with neurodiversity.

Research Question

How can teachers modify pedagogical approaches and equipment use in school movement contexts to positively impact student inclusion and physical literacy?

Methods

Participants in this study included eight school staff, including PE teachers, educational assistants, and resource teachers, from two elementary schools who interact directly and frequently with students with neurodiverse needs.

This multi-method study examined the impact of inclusive movement experiences in schools on staff and students through participant observations, semi-structured interviews, and reflective journal entries. Measurements were taken at baseline (fall), midpoint (winter), and endpoint (spring) during one school year.

- Participant observations of PE and movement spaces allowed for the examination of the strategies and practices being implemented by the school staff.
- Semi-structured interviews were conducted with the school staff at two different timepoints to learn about potential shifts in perspectives and approaches over the course of the school year.
- Reflective journal entries allowed for the school staff to reflect on the changes in strategies and equipment they were implementing.

This project involved a Participatory Action Research (PAR) approach, allowing school staff (PE teachers, educational assistants, resource teachers) and researchers to collaborate across the entirety of the study. For this study, research was conducted alongside the participants, rather than on them (Baum et al., 2006). Historically, PAR has been used to collaboratively address social, educational, and community-based issues by directly involving participants in identifying problems, generating knowledge, and implementing meaningful change. The research team for this study included the school staff and university faculty and students. The university team had pre-existing relationships with the participating PE teachers, which supported this collaborative partnership and allowed for the project to follow the PAR approach. Additionally, the two schools involved had an established relationship with each other and the PE teachers shared similar pedagogical philosophies, as well as resources such as equipment, which further supported the alignment and collaboration across locations.

PAR cycles occurred at multiple timepoints, allowing for the cyclical process of planning, acting, observing, and reflecting (Kemmis & McTaggart, 2005) to unfold throughout the study. At each stage, data collection informed reflection and guided later planning and action, ensuring that changes were made in response to emerging needs. Meetings with the research team took place throughout the school year, which provided school

staff the opportunity to share, collaborate, and learn from each other, which allowed researchers to identify how to best support the staff, and to meet the unique needs of each school environment.

Using the PAR approach allowed everyone to “play on the same team” and work towards establishing inclusive, joyful, and meaningful environments for students with neurodiversity within PE and movement settings (Morrison & Gleddie, 2019). Although there were similarities across the two school contexts, it is important to recognize that both schools have different needs and complexities. So what is needed in the schools differed across locations; however, working collaboratively with school staff within both schools ensured that we were meeting the needs that were present in both locations.

Strategies Implemented and Professional Development Opportunities

As part of this project, several strategies were implemented and opportunities provided to support the achievement of the project goals. These strategies were designed to reduce barriers to movement participation and enhance school staff ability to support inclusion. Specific strategies included the incorporation of inclusive equipment, the implementation of a soft-start program, and professional development training for school staff.

- **Professional Development Training**

A professional development session titled: *Regulation, Movement, & Belonging: Neuroaffirming Physical Literacy* was delivered to the school staff and researchers by Desirea Binning of Regulate & Thrive Consulting. Drawing on both professional expertise and lived experience, Desirea introduced practical frameworks and strategies to support neuroaffirming practice, including the Arc of Regulation, Anatomy of a Body Break, and the SCRIV (Safe, Connected, Regulated, Valued) framework. Participants of the PD session reflected positively on the training, noting that it encouraged new ways of thinking about student support while providing actionable strategies for implementation. As one physical education teacher shared, “It was amazing ... Seeing Desirea’s passion, she has lived experience that was very emotional to hear and clearly drives her work ... She gave us strategy. She got us thinking about things in a different way.” The training also inspired staff to be more intentional in their approaches to fostering regulation, belonging, and meaningful participation for all students, especially those with neurodiverse needs.

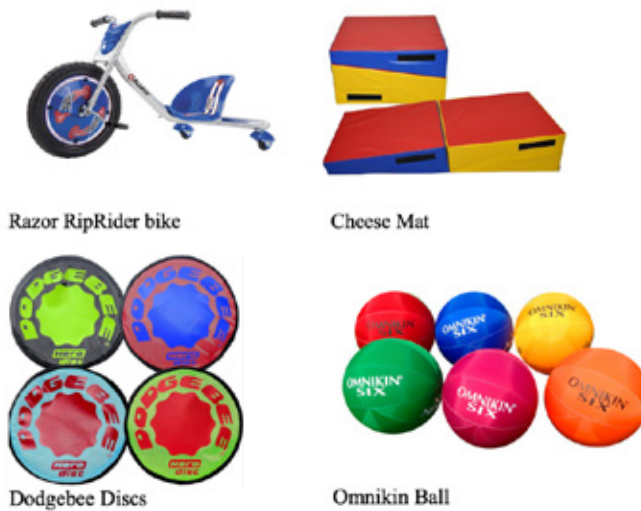


Learn more at
<https://regulateandthrive.ca/about/>.

- **Inclusive Equipment**

PE teachers offered a variety of inclusive equipment to allow the students to participate regardless of ability. Intentionally incorporating inclusive equipment as part of the approach created more accessible and predictable learning environments, by controlling factors such as noise, texture, weight, and visual.

Examples include – Wheels: Razor RipRider bikes, drift bikes, skateboards; Mats: Cheese mats, wedges, roll-out mats; and Other: Dodgebee discs, Omnikin ball.



- **Soft Start**

A soft start can be defined as a low-pressure entry routine designed to foster choice, allow for preparation time, and support gradual engagement, by providing students the time and space needed to regulate, engage, and prepare for learning.

The introduction of a soft start at one of the schools, offered three mornings a week, created a supportive environment where students could regulate their emotions, prepare for the day ahead, and transition into the school setting in a positive way. By providing a calm, flexible space before the start of classes, soft start helped students feel more comfortable, engaged, and ready to learn. The SENSE-ational Schools program emphasized choice and self-directed participation, allowing students to select activities that met their individual needs while also providing opportunities for social interaction in a low-pressure environment. Parents observed meaningful benefits, including increased confidence, improved emotional regulation, and greater overall happiness. As one parent shared, “From a young age, he would become overstimulated quickly and found it difficult to participate ... Soft Start has been amazing for him. Since the start of the program, his confidence has increased, he’s less emotional dysregulated, and is happier overall. Soft Start provides a safe space for him to express himself. He likes being able to choose the activity, interact with peers (when he wants to), and the calmer atmosphere. He is always happy to go to school when the day starts with Soft Start!” This reflection highlights the important role that supportive, choice-based environments can play in promoting student well-being and school engagement.

Results

Four themes were identified as a part of this study: (1) Building a SENSE of Community, (2) Connecting with Peers, (3) Improved Communication Skills, and (4) Agency & Creativity.

1. Building a SENSE of Community

Students developed a strong sense of belonging through shared movement experiences within the SENSE-ational Schools program. These connections often extended beyond the program, with relationships continuing during recess, in classrooms, and even outside of school through things such as birthday parties. Students also demonstrated increased empathy for their peers by learning to respect boundaries, support one another, and look out for each other's well-being. As one of the PE teachers noted, the program fostered, "respecting each other, being able to move independently, having fun while building skills," highlighting both the social and developmental benefits experienced by the students.

2. Connecting with Peers

Students formed meaningful relationships and friendships through participation in SENSE-ational Schools, creating opportunities to connect with peers who shared similar interests and experiences. A resource teacher emphasized that "inclusion is not always about being with chronological age peers ... but rather about connecting with developmental peers" and "like-minded peers." The program supported these connections by offering choice-based activities and stations without a time limit; PE teacher discussed that it allowed students to "find different people to connect with based on what they're choosing that day." Opportunities to share knowledge, learn from one another, and experience joyful movement together further strengthened peer relationships and fostered a sense of belonging and inclusion for the students with neurodiverse needs.

3. Improved Communication Skills

Students demonstrated growth in both verbal and non-verbal communication skills through their involvement in SENSE-ational Schools. As students with neurodiverse needs experienced greater inclusion and a stronger sense of belonging, they often became more comfortable expressing their needs, preferences, and ideas with teachers, peers, and educational assistants. Improved communication also supported stronger relationships and more effective interactions across school environments. Reflecting on this impact, one PE teacher shared, “I feel like I can communicate with him better and he can understand me more,” highlighting the mutual improvement in understanding and connection that emerged through participation.

4. Agency & Creativity

Students were encouraged to make choices and contribute their own ideas throughout program activities fostering a sense of autonomy and ownership in their learning experiences. Providing opportunities for students to choose how they interacted with the environment helped promote feelings of empowerment, confidence, and engagement. Movement-based tasks also supported creative expression by encouraging students to explore new ways of moving, solving problems, and adapting activities to their interests and abilities. Through improvisation, collaboration, and shared decision-making, participants developed important skills while gaining confidence in expressing themselves. As one PE teacher reflected, “it is just ... choice ... and then you really see these kids that flourish,” reinforcing the positive impact that autonomy and self-directed participation can have on a student’s growth, creativity, and overall engagement.

Conclusion and Implications

PE and movement spaces are for everyone; enhancing inclusion in these spaces has allowed students to feel like they belong and can thrive in movement. This project clearly identified the importance of meeting the students where they are at and providing them with meaningful choice and agency so they can explore their interests. Certainly, this program will look different in each school, but the strategies and findings of the current project provide important insights for future implementation.

This study has the potential to inform future practices, policies, and programming decisions that foster more inclusive, accessible, and meaningful movement experiences for all students. By highlighting the importance of choice, belonging, regulation, peer connection, and neuroaffirming approaches to physical literacy, the findings offer valuable insights for educators and schools seeking to create environments where every student can participate, thrive and experience the joy of movement regardless of their ability. The lessons learned through this work can help guide the development of more responsive and inclusive physical activity programming that supports the diverse needs and strengths of all students in your school.



To see what this looked like in practice, please visit <https://youtu.be/WEQvuz5yvU8> to view our **SENSE-ational Schools** mini documentary, which showcases the experiences of students, school staff, and the families involved in the project.

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SENSE-ational Schools: Strategies for Inclusive Movement Spaces

1 Soft Start / Soft Landing

Provide an intentionally designed period of time at the beginning of a lesson / school day that allows students to enter the learning space gradually.

- Combines unstructured play with a consistent routine
- Encourages cross-grade interaction
- Provides a calm, less intimidating environment



Proven in Practice

Moving away from the sport-centric mindset/pedagogy and moving towards an inclusion-focused pedagogy.

Together, these strategies contribute to movement spaces that prioritize meaningful and positive experiences for learners of all abilities.

2 Calming Environment

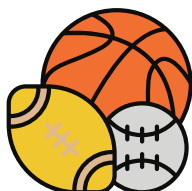


Gymnasiums can be overstimulating. A calming space that minimizes loud noises, uses soothing music (60 bpm, no words), and appropriate lighting helps students feel more safe, regulated, and ready to learn.

3 Inclusive Equipment

Offer varied equipment that allows all students to participate regardless of age, ability, confidence, experience, or physical differences. Takes into account sensory considerations and possible adaptations.

- Wheels: Razor RipRider bikes, drift bikes, skateboards
- Mats: Cheese mats, wedges, roll-out mats
- Other: Dodgebee discs, Omnikin balls



4 Meet Students Where They're At

Provide students with meaningful choice and agency so they can explore their interests while forming new, unexpected connections with peers. Instead of focusing on competition, skill proficiency, and athletic performance, inclusive spaces emphasize participation, belonging, and personal growth.



SENSE-ational Schools

Physical Literacy Enriched Movement Opportunities for Students with Neurodiversity

PROJECT SNAPSHOT

Children with neurodiverse needs often do not have the same opportunities for success in school movement spaces. To explore possible solutions, physical education teachers, educational assistants, resource and classroom complexity teachers, and researchers collaborated on a project to explore how changes in instructional strategies and equipment could support more inclusive movement spaces.

“Inclusion is not always about being with your chronological age peers ... **inclusion is a lot more about being with your developmental peers** - Teacher”

“Respecting each other, being able to move independently, having fun while **building skills** - Teacher”



BUILDING A SENSE OF COMMUNITY

Shared movement experiences fostered a sense of belonging and supported empathy development, forming relationships that extended within and beyond the school day.



CONNECTING WITH PEERS

The program helped students find similar interests and experience joyful moments together.

“ I feel like I can communicate with him better and he can understand me more – Teacher ”

Communication growth often can be seen through actions. A student who once sat out of activities is now smiling, excited to move, and asking to play large group games.

“ It is just about allowing for choice . . . and then you really see these kids that flourish – Teacher ”



IMPROVED COMMUNICATION SKILLS



Participation enhanced verbal and non-verbal communication skills between peers and with school staff. Students were more comfortable expressing their needs.

AGENCY AND CREATIVITY



Movement opportunities supported creative expression, exploration, and collaborative decision-making.

“ From a young age, he would become overstimulated quickly and found it difficult to participate. This program has been amazing for him. **Since the start of the program, his confidence has increased, he's less emotionally dysregulated, and is happier overall** – Parent ”



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2317 Arlington Avenue
Saskatoon SK Canada S7J 2H8
Phone: 306-373-1660
Toll Free: 1-800-667-7762
Fax: 306-374-1122
Email: mcdowell@stf.sk.ca

www.mcdowellfoundation.ca

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