

Developing pre-reading skills through movement

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Introduction

My job as a Reading Recovery and French Resource teacher involves identifying and supporting students in the primary setting who are at risk in reading and writing. Each year, approximately 20% of students in kindergarten are identified as being at risk in pre-reading skills. By grade 1, the percentage of those at risk has not decreased significantly despite resource intervention throughout their kindergarten year. After further assessment in grade 1, the lowest students are invited to join the Reading Recovery program. Reading Recovery is an intensive one on one research-based program that aims to close the gap for students with literacy difficulties before they become lifelong obstacles.

Whilst the Reading Recovery program has proven effective in addressing these literacy challenges, it is a resource-intensive approach, requiring significant time and support to ensure student success. Despite these efforts, some students remain still at risk, even after receiving both intensive kindergarten resource support and Reading Recovery in grade 1.

This reality has led me to investigate whether integrating alternative methods, such as learning through movement, could further enhance early literacy development. Specifically, I aim to explore whether incorporating perceptual motor skills and gross motor activities into the learning process can improve pre-reading letter knowledge in kindergarten students. By adding more ways of learning letter knowledge, I am curious to see if this approach might reduce the need for additional support when these students enter grade 1.

In my school, most teachers recognize the potential benefits of movement in enhancing learning. However, there is a lack of structured programs that put this theory into practice. Through this proposal, I plan to design a 6-week intervention program for kindergarten students that combines physical movement with letter knowledge instruction during Physical Education lessons. The goal is to create a concrete program that not only enriches students'

letter recognition but also offers a practical and scalable approach for other teachers in the district.

Research Aim

The aim of this research is to explore whether learning through movement improves pre-reading letter knowledge in kindergarten students.

Research Questions

- To what extent does integrating physical movement into letter knowledge instruction enhance pre-reading letter knowledge in kindergarten students?
- How do perceptual motor skills contribute to the development of letter knowledge in early learners?
- Does incorporating movement-based learning strategies result in better preparedness for grade 1 compared to traditional literacy instruction methods?

Objectives

- To design, implement, and evaluate a 6-week intervention program that integrates physical movement with literacy learning during PE classes that improves pre-reading letter knowledge among kindergarten students.
- To examine how perceptual motor skills contribute to letter knowledge development.

Topic Justification

While Reading Recovery has demonstrated to be effective, it demands considerable time and individualized support, which may not always be feasible within the constraints of school resources. Additionally, there is limited exploration into how incorporating movement and physical activity into literacy instruction could complement existing teaching methods and address gaps in student learning.

This proposal aims to address these gaps by investigating the potential of integrating physical movement with letter knowledge instruction. Specifically, it will explore whether a 6-week intervention program that combines gross motor skills with literacy activities during physical education classes can enhance pre-reading letter knowledge in kindergarten students. The goal is to assess if this movement-based approach can improve early literacy development and reduce the need for intensive support as students transition to grade 1. By designing a structured program that leverages the benefits of movement, this study seeks to offer a practical method for supporting at-risk students, that could potentially be used by other schools.

Literature review

Introduction

The role of physical movement in enhancing early literacy skills has not been extensively studied but has recently become an area of increased interest. This literature review explores how perceptual motor skills and movement-based learning approaches have shown to have positive impacts with letter knowledge.

Letter knowledge

Letter knowledge refers to a child's understanding and recognition of letters and their corresponding sounds. This includes the ability to identify letters, by name and associate them with their phonetic sounds. It is a critical component of early literacy development, serving as a foundation for reading and writing skills. Mastery of letter knowledge is essential for children before they can read. Letter knowledge helps students to decode, and blend sounds to form words, which is crucial for their reading development.

Review of key studies

Recent research has highlighted the potential benefits of incorporating physical movement into literacy instruction. Bara and Bonneton-Botté (2018) investigated the effectiveness of whole-

body learning compared to traditional visual teaching methods taught in the kindergarten classroom. Their findings revealed that visuomotor approaches, which involved physical movement of the whole body, significantly enhanced letter recognition. This study supports the hypothesis that integrating movement can facilitate letter learning more effectively than solely visual mental methods.

Similarly, Botha Sharnay and Africa (2020) examined a perceptual-motor intervention and the relationship between motor proficiency and letter knowledge. Results showed a positive correlation between overall motor proficiency and letter knowledge. Relationships were found between reading and specific gross motor skills, namely bilateral coordination, balance and upper limb coordination. This research highlights the connection between motor skills and literacy development, suggesting that perceptual motor skills are an effective way for acquiring letter knowledge.

Köse et al. (2024) investigated a visual praxis based occupational therapy (VPOT) program and its effects on reading and motor skills in children with developmental dyslexia. Their findings indicated that the VPOT is an effective intervention program to improve both reading skills and motor skills, suggesting the idea that reading, and motor skill problems experienced by children with developmental dyslexia are closely related.

The study by Damsgaard et al. (2022) did not find a correlation between motor skills and reading but it did find a significant improvement in children's ability to name letter sounds when learning happened through whole body movements compared to no movements.

The research explored the impact of embodied learning on pre-reading and word reading skills. According to the theory of embodied learning, cognitive processes are intertwined with physical experiences and actions. Damsgaard et al.'s findings align with this theory, showing that physical engagement in learning activities, rather than simply passive learning, promotes deeper and more effective learning. By integrating whole body movement into letter sound

knowledge learning, the study highlights how learning is not just a mental process but is connected to the physical experiences and actions of the learner.

Another study grounded in embodied learning is by McClelland, Pitt, and Stein (2015), which utilized the Move4words intervention program. This program involved a series of physical exercises designed to activate brain regions associated with movement and cognition. The exercises targeted visual attention, eye-tracking skills, mild aerobic activity, limb movement patterns, and cross-lateral body movements. The study found that the intervention was particularly effective for students in the lowest academic percentile, leading to significant improvements in their academic performance.

Suggate et al. (2018) distinguished between fine motor skills and graphomotor skills (those involved in holding a pencil). Like Damsgaard et al. (2022), the study found no correlation between fine motor skills and reading. However, it did establish a connection between graphomotor skills and reading, reinforcing the notion that early reading development is closely linked to manual motor skills.

In a related area of research, Longcamp et al. (2005) examined the effects of handwriting practice versus typing on letter recognition in preschool children. Their findings confirmed that handwriting practice led to better letter recognition than typing. This study offers additional insight into why movement-based learning may be effective in enhancing early literacy skills.

Conclusion

The reviewed literature supports the positive impact of movement-based learning on early literacy skills. The evidence suggests that incorporating physical activities into literacy instruction can enhance letter knowledge and reading readiness. However, there is a gap in the research regarding intervention programs that combine pre-reading skills and physical education. Most studies have investigated isolated aspects of motor skills and literacy separately, without merging them into a comprehensive program that can be used during

Physical Education classes. This research aims to address this gap by designing and evaluating a 6-week intervention program that integrates physical movement with letter knowledge instruction.

Theoretical Framework

This study is grounded in the theoretical perspectives of embodied learning and perceptual motor skills development, both of which highlight the role of physical activity in cognitive processes. Building on the work by Lawrence W. Barsalou (2008), these theories suggest that learning is not solely a mental process but one that is deeply connected to the body and its movements and therefore that learning through movement can enhance cognitive development.

Ontology

The ontological position of this research aligns with constructivism, where knowledge is seen as being actively constructed through interactions with the environment, rather than passively absorbed. In the context of my research, this perspective holds that young children build their understanding of letter knowledge through both cognitive engagement and physical movement.

Epistemology

The study adopts a pragmatist epistemology, where the focus is on the practical application of knowledge. Pragmatism assumes that knowledge is best understood in terms of the outcomes of actions. In this study, the goal is to determine whether learning letter knowledge through movement can lead to improved pre-reading skills. The intervention will be conducted in a real-world educational setting where the focus is on actionable insights that could help reduce the number of students requiring intensive literacy support in grade 1.

Application to the Study Design

This theoretical framework directly informs the design of the intervention. By combining gross motor activities with letter learning, the study builds on the idea that engaging the whole body in learning can enhance both motor skills and cognitive outcomes. The study hypothesizes that this embodied learning approach will provide students with a more complete understanding of letter knowledge, leading to better preparedness for grade 1 literacy expectations.

Methodology

Research Design

This study will utilize an experimental design, implemented on two kindergarten classes, each consisting of 20 students. Due to the composition in my school, one class will be taught in English and the other one in French. Both classes will be taught concurrently with no waiting group. Both classes will be assessed for letter knowledge before and after the intervention using a district standard assessment tool.

Participants

The study will involve all students from two kindergarten classes, with a maximum total of 40 participants. Participants will consist of the entire class, with no exclusion criteria applied.

The intervention / Product production

The intervention will be a 6-week program combining gross motor skills with letter knowledge instruction. The program will take place twice a week during Physical Education (PE) classes. Activities will be designed to integrate physical movement with learning letter knowledge.

Developing this program will be a key element of the project, and I will draw upon existing literature to guide its creation. For instance, Köse et al. (2024) implemented a visual praxis occupational therapy program, while Damsgaard et al. (2022) designed an 8-week embodied

learning program. I plan to investigate the activities used in such studies and adapt them for my intervention. Potential activities may include:

- Secret agent code game - tracing letters in the air using a ribbon or hand and having a partner decipher the code
- Statues - forming letters with large physical movements, and then asking students to match letters with corresponding movements.
- Letter relay races: Students participate in relay races where they must identify and collect letters placed around the gym.
- Letter hopscotch: A hopscotch game where each square represents a different letter, and students must call out the letter they land on.
- Alphabet obstacle course: An obstacle course where students perform physical tasks related to different letters (e.g., j = jumping)
- Letter toss: Students throw beanbags into hoops or targets labeled with letters, practicing letter recognition.

The key challenge will be designing a clear and structured scope and sequence for teaching letter knowledge, ensuring that learning progresses logically and effectively. I will create activity stations that promote independent learning, requiring minimal supervision while still engaging students in meaningful, self-directed tasks. Additionally, I will need to carefully consider how to design games that are not only fun and accessible to all students but also adaptable in difficulty, allowing for scaffolding that supports each child's development at their own pace.

Method Tools

Letter knowledge will be measured using the K protocol, which assesses pre-reading letter knowledge. The assessment is comprehensive, assessing letter knowledge, concepts of print and blending and segmenting sounds. The assessment will be conducted before the intervention begins and again after its completion. To ensure the reliability and validity of the

measurement tools, both pre- and post-intervention assessments will be conducted using the same protocol and administered under similar conditions.

Data Collection

Data will be collected at two points: before the intervention begins and immediately after the intervention concludes. I will be responsible for collecting the data and I am fully trained and familiar with the administration of the K protocol.

Data Analysis

Data will be analyzed using SPSS. The effectiveness of the intervention will be determined by comparing pre and post-intervention scores. Statistical methods will include paired t-tests to evaluate changes within each class (due to the different language) as well as testing a whole.

Ethical Considerations

This study will adhere to strict ethical guidelines to ensure the protection and well-being of all participants. The research will be conducted in accordance with the Tri-Council Policy Statement (TCPS 2), which outlines ethical conduct for research involving humans in Canada. Specific ethical considerations for this study include the following:

Informed Consent

Prior to participation, informed consent will be obtained from the parents or legal guardians of all kindergarten students involved in the study. A detailed consent form will outline the purpose of the research, the nature of the intervention, potential risks, and the rights of the participants. Parents will be informed that participation is voluntary and that they can withdraw their child from the study at any point without any consequences or impact on their education. Additionally, verbal assent will be sought from the students to ensure they understand their participation to the extent that is developmentally appropriate.

Confidentiality and Anonymity

All data collected during the study will be kept strictly confidential. Participant names and identifying information will be anonymized during data entry and analysis, and any publications or reports resulting from the study will not contain information that could identify individual participants. Data will be securely stored in password protected digital files, and access will be restricted to myself and my supervisor. Physical copies of data, if any, will be kept in a locked storage area.

Minimizing Harm

The study poses minimal risk to participants, as the intervention involves typical physical education activities combined with letter learning exercises that are age-appropriate for kindergarten students. However, if any discomfort or stress is observed during participation, students will be allowed to opt out of specific activities. The school gym where the study takes place is familiar to the students, which should minimize potential anxiety or stress related to participation.

Equity and Fairness

No student will be excluded based on ability, gender, socioeconomic status, or other factors.

Use of Data

The data collected will be used solely for the purposes of this research project. Findings from the study may be published or presented at conferences, but all information will remain anonymous. Data will be kept for a period of 1 year, after which it will be securely destroyed.

TCPS 2 Compliance

I will complete the TCPS 2: CORE-2022 on research ethics. This ensures that I am familiar with the ethical standards required when conducting research involving children.

Institutional Ethics Approval

Prior to commencing the study, ethics approval will be sought from the University of Wales Trinity Saint David's ethics board. The board will review to ensure compliance with ethical standards and assess potential risks to participants. The study will not begin until approval is granted, and any significant changes to the research plan will be submitted for additional review if necessary.

Challenges and Limitations

The primary challenge will be determining the extent to which any observed progress can be attributed specifically to the intervention, as opposed to regular classroom activities and instruction. Another challenge I see is ensuring that the activities are appropriately scaffolded for all students, particularly those with differing levels of motor skills or letter knowledge. Some students may progress faster than others, requiring me to think of adaptations for each activity.

An additional challenge I may encounter is the language difference between the classes. Since one kindergarten class will be taught in French and the other in English, this introduces an additional variable that could affect both the intervention and data analysis. Differences in language instruction could impact how students engage with the activities and how they acquire letter knowledge, which may complicate comparisons between the two groups. This variability will need to be carefully accounted for when analyzing the results, as it could influence the overall findings of the study.

Schedule Deadlines

- September 16, 2024: Complete proposal
- October 1, 2024: Ethics review and completion of all forms
- November 29, 2024: Send home consent forms
- December 31, 2024: Create the 6-week program, including materials and instructions
- January 10, 2025: Complete K protocol pre-intervention assessments

- January 13, 2025: Start intervention
- February 21, 2025: Finish intervention
- February 28, 2025: Complete post-intervention K protocol assessments
- March to June, 2025: Data analysis and writing dissertation
- June 31, 2025: Submit dissertation

Conclusion

This proposal outlines an intervention designed to explore the impact of embodied learning on letter knowledge in kindergarten students. By integrating physical movement with cognitive tasks, this study aims to provide an additional approach to early literacy instruction. The results of this study may have the potential to inform teachers of an additional way of teaching early childhood literacy and reduce the need for intensive supports in subsequent grades. Future research could build on this work by exploring its long-term effects on literacy development.

References

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Authorization for Quilchena Elementary (SD39) to serve in an Experimental Research study for: BMPE 7010 - University of Wales Trinity Saint David

Project purpose:	The purpose of this study is to explore whether learning through movement improves pre-reading letter knowledge in kindergarten students.
Researcher:	Pierre Romano Phone number: 604 339 8754 (Cell)
Location of the study:	Quilchena Elementary - In the gym
Supervising instructor:	Dr Kate Piper, Program Lead, MA Physical Education Sport and Physical Literacy - k.piper1@uwtsd.ac.uk
Research question:	To what extent does integrating physical movement into letter knowledge instruction enhance pre-reading letter knowledge in kindergarten students?
Procedures:	The intervention will be a 6-week program combining gross motor skills with letter knowledge instruction. The program will take place twice a week during Physical Education (PE) classes. Activities will be designed to integrate physical movement with learning letter knowledge in a fun an engaging way. All students in the class will be assessed for letter knowledge before and after the intervention using the K protocol, a district standard assessment tool.
Time and duration:	Approximately 6 (January 13 th , 2025 to February 21 st , 2025)
Benefits of the study:	Improvement of pre-reading letter knowledge among kindergarten students so that they are better prepared for grade 1
Persons with access to raw data:	Only the following people will have access to the raw data: Pierre Romano and Dr Kate Piper
Raw data destruction dates	Any records with personal information on them will be kept for one year and destroyed by February 28, 2026.

I understand that participation in this project is voluntary, and I understand that a parent or guardian may withdraw his/her child from this study at any time by notifying the researcher.

Statement of confidentiality:
The participation of the students in this project is confidential. Only the researcher, collaborators, and supervising instructor will have access to the students’ identities and to information that can be associated with their identities.

- Please check the appropriate box below and sign the form:
- ☐ I give permission for my school to participate in this project. I understand that I will receive a signed copy of this consent form. I have read this form and understand it.
 - ☐ I do not give permission for my school to participate in this project.

Signature of principal

Date

Informed Consent for Parents – November 29, 2024

Dear Parent/Guardian

As part of my Masters in Physical Education Sport and Physical Literacy at University of Wales Trinity Saint David, I have undertaken to research whether learning through movement improves pre-reading letter knowledge in kindergarten students.

The research will take place twice a week during Physical Education (PE) classes. I have created a 6 week program based on activities that are designed to integrate physical movement with learning letter knowledge in a fun and engaging way. All students in the class will be assessed for letter knowledge before and after the program using the K protocol, a district standard assessment tool. I would like your permission to use the data from the district approved assessment tool (K-protocol) to use as part of my research.

I understand that participation in this project is voluntary and anonymous. If your child or you wish not to have their data included at any point during the research, you or they can request to not have the work included. Students will be under no pressure and at no risk of negative effect should they choose not to participate in the research. In addition, there will be no negative impact on their PHE experience, teacher feedback or grades. All aspects of the research are part of a regular PHE curriculum, so that all students regardless of participation in the research will experience the entire PHE program. The only difference being that only those participants that have consented will have their data included in the research. My research will run between January 13th, 2025 to February 21st, 2025

Your child's safety is of the utmost importance to me. I will protect your child's privacy by removing their name and any other information that would identify them. The teaching and assessment involved in this study are part of our regular teaching practice and requirements relating to the Provincial curriculum. The materials I am working on will not be sold for profit and will only be used for academic purposes, such as being assessed by my instructor.

I would be happy to discuss any element of my research with you. Furthermore, this research will have no impact on your child's progress or grade in the courses I teach. If you are comfortable with my request at this time, please complete the form below. Thank you for your help.

Pierre Romano
promano@vsb.bc.ca

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As the parent/guardian of _____,

- ☐ I do not give permission

- ☐ I give permission to Mr Pierre Romano to use the K protocol data of my child for his research during the 2024-25 school year. I understand that my child's privacy will be protected, and the material will not be sold for profit.