

Movement, Observation, and Collaboration: Pre-service Teachers' Implementation of a Mobile Motor Lab

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Abstract

A kindergarten classroom teacher and four pre-service teachers implement a mobile motor lab in a classroom setting to observe how movement can affect behavior and attention in kindergartners (n=24). Based on observation and journal recording during the five-month process, three themes emerged: 1) an increase in motor development by the participants; 2) an increase in concentration while participating in classroom activities; 3) an increase in self-confidence in teaching with movement from the pre-service teachers. Movement also appeared to be beneficial for student behavior. Pre-service teachers gained more confidence in teaching movement opportunities, and it's benefits on classroom management.

Keywords: movement, pre-service teachers, motor lab, classroom management

Introduction

The action research study explores the effects of motor skill instruction and practice with kindergarten students. The classroom teacher asked a local university professor for help in implementing the action research study. The professor offered the opportunity to four elementary education students who volunteered to help with the bi-weekly implementation of the motor lab. An action research methodology was used due to the analytical design. This design provides the teacher with an awareness of how to approach issues or problems within the classroom. The nuances of everyday experience with the motor lab show a complete picture of how it affects student behavior during instruction and helps educators develop practical solutions to address them quickly and efficiently. Research shows that teachers are acknowledging that "soft skills" such as auditory discernment, symbol recognition, visual flexibility, and self-regulation are lacking. When early learners do not develop naturally through sensory and developmental stages, they need specifically targeted practice in reflexive patterns, tactile experiences, as well as proprioceptive and vestibular motor skills. Benefits from motor skill instruction range from strengthening the mind-body connection to the improvement of development, health, and cognitive skills (Albin, 2016). These areas were targeted by daily use of the motor lab, targeting specific areas of gross motor movement.

Attention to early development can be the first step in the prevention of school failure (Oden, 2006). Without specific practice to develop these motor skills, those students struggle to conform to simple school tasks like sitting in their chair or correctly holding and gripping a pencil. The purpose of this study is for the classroom teacher and the pre-service teachers to observe kindergarten students as they facilitate a mobile motor lab in a kindergarten classroom, identifying changes in the ability of gross motor skills in students. By providing motor/sensory learning experiences, kindergarten students will practice and develop proper motor movement.

Motor responses, patterns, and skills combined with the category of motor planning, is a product of the development of reflexive, kinesthetic, tactile, vestibular, proprioceptive, visual, and auditory systems (Oden, 2006). The goal is to promote perceptual-motor abilities, including spatial awareness, balance, and laterality, hand-eye, and eye-foot coordination.

Teachers will stimulate the proprioceptive and vestibular systems, including the reticular activating system (RAS) which acts as the ignition system of the brain that awakens an individual to a state of heightened awareness and improved attention. Visual signs or clues will be children balancing, walking, running, hopping, jumping, throwing, catching, kicking, and skipping.

Literature Review

One emerging theme in research is the amount of time spent on sedentary activities in classrooms. Many schools are increasing the time spent on sedentary test-prep in early grades, even though research suggests that activity is better for students (Jensen, 2000, 2006). Merely passive experiences tend to attenuate and have little lasting impact. Early childhood students demonstrate different stages and patterns of physiological and neurological development. Their developmental stages are essential to academic readiness but are often overlooked in the school's quest to increase rigor in the educational curriculum for early childhood grades. A study conducted in 1966 (Gavatos, 1967) examining gross motor skills found that learning involves the execution of a series of movements in a sequential pattern, the smoothness of one's performance is dependent on the feedback received after each movement sequence performance.

An example of this would be activities reinforcing bilateral coordination skills, which prepares tracking behavior for reading and writing readiness. The study linked the execution of movement to one's cognitive abilities, reinforcing that purposeful motor development practiced sequentially and immediate feedback on performance must be in consonance if an excellent motor performance is expected (Gavatos, 1967). Thus, linking the importance of gross motor development and academic readiness for pre-school and kindergarteners.

Another emerging theme is the benefit of movement on the brain. The brain learns best and retains most when the child is actively involved (Gardner, 1999). Using movement during learning can ready the brain and body for education, increase the level of motivation, and help people remember and recall information (Lengel & Kuczala, 2010). Research suggests that teaching pre-primary aged children early literacy and movement in tandem is more beneficial than teaching either in isolation (Callcott, Hammond & Hill, 2015). For these movements to change the brain, repetitive practice overtime is required (Jensen, 2005). New learning can occur through motor pathways activated by subtle or imagined movement (Koester, 2010). Movement is one of the essential strategies for engaging the brain. Anything learned while moving goes into procedural or muscle memory (Tate, 2012). The awareness of the benefits of movement opportunities currently seen is through the increase of standing desks in schools and offices.

Pre-service teachers taking courses in a college education program volunteered to help in this action research study to provide a field experience opportunity with an effective teacher, which prepared them to utilize best practices within their classroom as teachers (Hobson, Harris, Buckner-Manley, & Smith, 2012). By the same token, the classroom teacher received the much-needed help executing the motor lab while also having the opportunity to collaborate and learn different perspectives on the activities from novice teachers. Pre-service teachers, considered as novice teachers, can bring fresh, new perspectives on common practices in which the mentor teacher can utilize into the existing culture of the classroom (Wang & Odell, 2007). Aiken & Day (1999) conducted a study to include the idea that pre-service teacher candidates may not interpret early field experiences as a type of on-the-job training, but rather think of themselves as college students involved in an off-campus activity. Examining the factors that contribute to this collaboration in early teaching experiences may inform

teacher preparation programs regarding how to provide meaningful learning experiences that provide pre-service teachers with support and a foundation to feel confident and become effective teachers (Tschannen-Moran and Woolfolk Hoy 2001). Some teacher education college students in one study noted that the field experiences did not provide "real" teaching experiences, and was, therefore, misleading (Aiken & Day 1999). By providing informal, authentic classroom experiences and working alongside an experienced, effective teacher, impacts the practical experience rather than it being just another coursework assignment. The study contributes to the limited body of literature exploring movement opportunities and teacher education students' experiences that occurs before student teaching. The experience of collaboration in this study was an added benefit that was unexpected.

Methods

The purpose of this action research study is for the classroom teacher and four pre-service teachers to observe kindergarten students as they facilitate a mobile motor lab in a kindergarten classroom, specifically observing potential changes in attention and behavior. Action research provides qualitative data that can be used to adjust classroom procedures, lessons, and activities, while qualitative research acknowledges the complexity of the classroom learning environment. Although quantitative research provides data demonstrating improvement or declines have occurred, it is not specific in identifying the causes of those deviations. Action research offers qualitative data teachers can use to adjust curriculum content, delivery, and instructional practices to improve student learning (Sagor, 2005). The portion, complexity, and variety of formats of qualitative data (e.g., transcriptions, documents, and journal keeping) often lack consistent structure; however, all are useful and imperative for conducting a comprehensive analysis (Dey, 1993). Familiarization with data collected involves the repeated reading of the data actively and collaboratively, searching for meanings and patterns.

The kindergarten teacher chose an action research methodology to investigate the everyday experience of her kindergarten students utilizing the mobile motor lab. The teacher and pre-service teachers wanted to observe and interpret their experiences with movement. This study used pre-service teachers as researchers to examine the experience of teaching and using movement, observe how to incorporate into a classroom setting, and look for themes that could be reproduced and replicated in their future classrooms. Student behavior cannot always be predicted or reduced to quantifiable data and logical terms. Action research is a systematic professional inquiry that empowers teachers to improve their practice (Sagor, 2005). Each researcher recorded observations through journaling and recording specific milestones of gross-motor and fine-motor activities (see table 1).

The knowledge learned from this study can support the need for motor lab movement in early childhood grades. Discussing the experiences of the cooperating classroom teacher and pre-service teachers may reveal areas of concern and an awareness that may lead to new ways of structuring the motor lab experience. The results of this study can guide educational professionals in the development of motor lab programs and generate further research questions to gather more information on how movement impacts behavior and learning. University pre-service teachers in their junior year volunteered to participate in the motor lab experiment as researchers. Catalayah Elementary in Claremore Public Schools was selected as a partner school because it is known for its innovative teaching practices. The study participants were 24 kindergarten children, 42% qualified for free-reduced lunch. The school demographics were as follows: White, 56.4% Black, 1.2% Hispanic, 11.3% Asian Pacific, 1.2% Native American Indian, 21.1% Hawaiian Pacific Islander, 0.2% Two or more races, 8.6%. The pre-service teachers collaborated with Ms. Storjohann, a kindergarten teacher, based on her tenured experience as a career early childhood teacher and graduate work in early childhood methodology. She practices whole brain teaching in an environment that allows for flexibility and creative movement

Table 1: Journal Recording Sheet

Mobile Motor Lab Recording Sheet, January.

Researcher _____ Student _____

Activity/Station	Introduction/ Comments	Emerging/ Comments	Mastered/ Comments
Whole group reflexive exercises; Rocking Horse, Popcorn, Wall Lean			
Station One: Mid-Line Cross using a Small Trampoline – the child bounces on the trampoline while using the right hand to touch an X on the left side of the wall and the left hand to touch an X on the right side of the wall. (hand-eye)			
Station Two: Ball Dribbling – basic ball-handling skills (hand-eye)			
Station Three: Beanbag Launcher Boards – bean bag is placed on the low end of the balance board, and as a child steps high end, it launches the bean bag in the air, and the child must catch it. (hand-eye)			
Station Four: Tactile tunnel (tactile)			
Station Five: Stability Ball Balance (building core strength)			
Station Six: Flip and Catch - child holds a cup with a string attached to the ball, and they must swing the cup and ball trying to put the ball in the cup (hand-eye)			

Research Procedures

The classroom teacher and pre-service teachers began by researching the impact of movement on the child/student, gathering information about existing motor labs, and designing our motor lab based on Catalayah's kindergarten class set-up. The equipment for the mobile motor lab included the following items: Trampolines, spinning boards, beanbag teeter boards, tactile tunnels, a balance bowl, balance beams, carpet squares, ball pit, plastic wands, flip and catch, jump hoops, jump ropes, twirl-n-jumps, hula-hoops, skip-n-hops, rubber rings, soft domes, mesh bags, duck walkers, exercise balls, and rubber playground balls.

The investigation began in January 2017 with the observation of student behaviors for one week while gathering data. A schedule created for the university students to help implement and observe students engaged in rotating centers using the motor lab five days each week in twenty-minute intervals for sixteen weeks (See table 2). Stations were created in different areas throughout the classroom. Students (n=24) were divided into six groups of four. The pre-service teachers demonstrated how each activity is performed and then guided students as each one completed the task independently. Adjustments were made based on the amount of time it took at each station, making activities longer or shorter, so each station warranted the same amount of time. As students learned the routines, researchers could more easily observe students' performances in each station and record observations. Each month new activities were introduced, and the difficulty of the task increased as students mastered each skill.

Ms. Storjohann and the pre-service teachers collaborated in the research study through the action research cycle, which includes the following steps: 1) Identify the problem, 2) Develop a plan, 3) Collect data, 4) Analyze data, 5) Form conclusions through reflection. The researcher can adjust and begin the process again if necessary (Sagar, 2005). The classroom teacher and pre-service teachers conferred on what activities were successful and which activities needed modifications based on how the students would perform the activities in the amount of time allocated. Successful activities were those that students could perform with success during the allotted time for each activity. This part of the action research process is essential because it helps identify what works and what does not work. This collaborative process not only helps the kindergarten teacher but also is an invaluable learning experience for the pre-service teachers.

Table 2: TimeLine and Description of Activities

January

Whole group reflexive exercises; Rocking Horse, Popcorn, Wall Lean

Six stations with four students at each station:

Station One: Mid-Line Cross using a Small Trampoline – the child bounces on the trampoline while using the right hand to touch an X on the left side of the wall and the left hand to touch an X on the right side of the wall(hand-eye)

Station Two: Ball Dribbling – basic ball-handling skills (hand-eye)

Station Three: Beanbag Launcher Boards – bean bag placed on the low end of the balance board, and as a child steps on the high end, it launches the bean bag in the air, and the child must catch it. (hand-eye coordination)

Station Four: Tactile tunnel (tactile)

Station Five: Stability Ball Balance (building core strength)

Station Six: Flip and Catch - child holds a cup with a string attached to the ball, and they must swing the cup and ball trying to put the ball in the cup (hand-eye)

February

Whole group reflexive exercises; Rocking Horse, Popcorn, Wall Lean, Superman

Six stations in an obstacle course arrangement; five students per station

Station One: Stability Ball Balance Exercises – balancing and picking up objects from the right and left (core strength).

Station Two: Spinning Boards- child spins on the boards using their arms to move (vestibular).

Station Three: Beanbag teeter boards – Different size boards are introduced, causing the trajectory of the beanbag at different heights (hand-eye-foot).

Station Four: Hole Punch Activity (hand-eye)

Station Five: Ball Pit with Math Game – Students read a math problem and then search for the answer hidden in the ball pit (tactile, curriculum-based)

Station Six: balance beam

March

Whole group reflexive exercises Giraffe Stretch, Popcorn, Walking Horse, Superman

Six stations in rotation with curriculum-based activities in which the students can complete during the same amount of time within each station.

Station One: ball pit, with sight word, find – (Curriculum embedded tactile station)

Station Two: Plastic wands where child hold let's go and holds again – (hand-eye)

Station Three: Finger Ball Roll – tennis ball up and down the wall (tactile, Reflexive)

Station Four: Jump hoops, jump ropes, twirl-n-jumps (gross motor kinesthetic understanding)

Station Five: Floor Rings – child jumps and moves through the rings placed on the floor (kinesthetic and spatial awareness).

Station Six: Duck walkers – Styrofoam cylinders with strings that child walks on with the guidance of the ropes in hand. (core and rhythm).

April

Whole group reflexive exercises: Superman, Popcorn, Giraffe Stretch

Six stations with five students at each station:

Station One: Box Scotch – walk a path of random squares on the floor (balance, vestibular)

Station Two: spinning boards

Station Three: Padded floor ladder – using carpet squares child walks on hands and feet to move up the ladder moving from carpet square to square (kinesthetic, reflexive)

Station Four: a tactile tunnel (tactile)

Station Five: A Balance bowl – child balances and spins while sitting inside using the body to move cone-shaped spinner (core, vestibular).

Station Six: balance beam (balance, core, foot-eye coordination)

May

Whole group reflexive exercises; Rocking Horse, Popcorn, Wall Lean, Superman

Six stations with five students at each station:

Station One: A small trampoline alternating crossing the mid-line activities

Station Two: Hula-hoops, skip-n-hops (Balance, spatial awareness, core)

Station Three: Beanbag teeter boards

Station Four: Duck Walkers

Station Five: Rubber Ball Activates – (hand-eye coordination)

Station Six: Balance beam,

Conclusion of Findings

The motor lab was implemented on a daily schedule from January through May. The teacher and pre-service teachers confirmed by reviewing all the motor lab skills in the lab stations with Ms. Storjohann's students (n=24) and comparing observation of students' gross motor skills ability and classroom behavior in January to their gross motor skill ability and behavior at the end of the experiment in May. Based on observation and journal recording throughout the five-month process, three themes emerged: 1) an increase in motor development from the participants; 2) new perspectives on teaching with movement from the cooperating teacher, Ms. Storjohann; and 3) an increase in self-confidence in teaching with movement from the pre-service teachers. Most of the class participants showed visible gains in flexibility, gross motor reflexes, and midline crossing activities. Accuracy with tactile and proprioceptive exercises improved over time with the entire class of 24 students. The researchers also concluded that the focus on movement appeared beneficial for student behavior. Overall, there was a noticeable difference in attention and focus on academic tasks during the day. Less time was being spent on redirecting students during circle time and during activities that involved sitting. Movement-based activities are low-cost and easily implemented interventions to improve physical health, learning, executive functioning, memory, on-task behavior, and academic performance (Savina, Garrity, Kenny & Doerr, 2016). Teachers should regularly engage students with movement opportunities.

As teachers cultivate an understanding of motor concepts, they develop new insights and, ultimately, new techniques to assess and assist children's pathways to mature movement skills (Fuchs, 2014). The pre-service teachers commented during interviews that they gained valuable insight into student behavior prior, during, and after the motor lab implementation. They felt more prepared and confident to teach early childhood students during their fieldwork that semester than those students who did not volunteer to participate in the study. They noted significant observable changes in student behavior and gross motor skill ability. Ms. Storjohann had also observed considerable growth with her students regarding flexibility, coordination, large motor movement, ability to persist at a new task, and behavior during center time when the motor lab was present.

Ms. Storjohann wrote in her concluding thoughts that the main objective was to actively engage the whole class in each of the motor lab activities and verify if the movement helped her students focus better during lessons. She noted that certain activities needed too much one on one engagement to execute correctly with all students. It was also crucial to find a set of movement activities that each group was able to complete at the same time. Through reflection and discussion with the pre-service teachers, Ms. Storjohann identified specific motor lab stations that worked well together, and which activities needed more time or were not engaging to the students. The class used the motor lab three days a week in the morning and two days a week in the afternoon at the end of the day. As the students learned and practiced the exercises in the activities, they became more proficient with the rotation and how to perform each skill. After two weeks of use, she was able to step back and observe the students in stations performing and rotating with correct procedures. She commented that the lab reminded her of the Brain Gym activities. Programs like the Brain Gym help teachers with exercises that students can practice fostering flexibility, eye teaming, and hand-eye coordination. The activities prompt students to access their senses through hands-on physical experiences as young children should naturally perform (Dennison, 2010). Ms. Storjohann also noted that the students were more engaged in classroom activities, after using the motor lab, especially during carpet time.

After teaching and practicing the basic skills with the equipment, the researchers began to incorporate literacy and math skills into the stations. Instead of using flashcards to work on rote memorization, students were able to engage their bodies and minds and make stronger connections. Ms. Storjohann believes that the motor lab movement helped her students practice and master these skills more efficiently and effectively based on the growth of the students' math and reading scores at the end of the year.

Discussion

Ms. Storjohann noted that the morning implementation benefited the students more than the afternoon implementation because she could see the effects throughout the day. Quantitative studies on the activities used in this motor lab indicate that the movements facilitate balance, hearing, reading, memory, and improved reaction time (Dennison, 2010). The students seemed to be more focused and attentive during the lessons that followed. She stated that in her teaching experience, skill retention with students seemed higher in the morning hours than in the afternoon hours; however, during the afternoons, when children participated in the motor lab activities, the student engagement and focus on academic tasks were heightened. The link between motor movement and skill development increased with on-task focused behavior and engagement. Movement lights up the brain and fosters learning, innovation, flexibility, adaptability, and resilience (Jensen, 2005). The increase in movement opportunities throughout the day provides the brain with oxygen, which is imperative for implicit learning.

The pre-service teachers gained experience in action research, working collaboratively with public school partners, and numerous hands-on practices with motor skill development in early childhood students. Teachers are willing to learn these motor lab movements to add to their "teaching toolbox" given proper training and support. (Benes, Finn, Sullivan, & Yan, 2016). Teacher candidates and the classroom teacher gained new knowledge from working collaboratively to conduct, write, and publish the findings from the motor skill lab experiment. To explain, Vygotsky states that adults acquire new skills by working alongside colleagues, and students construct understanding through social interactions, such as talking about and collaborating on meaningful learning activities (Vygotsky, 1978). The evidence is convincing that collaborative activities enhance the effectiveness of student-centered learning over traditional instruction and improve retention of content knowledge. This experience also strengthened the partnership between Cameron University and Claremore Public Schools with the investment of time and resources in their students and schools.

One of the teaching candidates summed up her experience in the following: "I noticed some changes in the students and Ms. Storjohann during the research. Ms. Storjohann's approach to the motor lab became more inventive as time went on. First, she just incorporated the motor lab exercises, then when the students mastered them, she added a reading or mathematics task to go with them. When the weather was nice, we did the motor lab as an obstacle course outside, and the students loved it. The biggest change I saw in the students was an increase in confidence. Even some of the shiest students became confident as motor lab continued. Another change I saw in the students was an increase in motor ability. The students mastered the activities quickly and rarely needed reminders on what the procedures were. The students appeared engaged during the motor lab, and only a few needed reminders to stay on task. I understand now how this process benefited the students."

Another teacher candidate commented: "For me, this research project was a valuable learning resource in my journey to become a teacher because it allowed me to learn from Ms. Storjohann. This project allowed me to experience classroom management in a real classroom: callbacks, attention grabbers, and ways to engage students. The project also changed the way I approach teaching. Being a very analytic learner, I always believed that noisy classrooms were not beneficial to students. Being in this classroom taught me that noise doesn't necessarily mean that students are off task; it can signal engagement. This realization will be very beneficial to my students in the future because I plan on incorporating movement exercises that require students to interact and make some noise. My greatest take away from this project is that I want to incorporate a motor lab, and some of Ms. Storjohann's procedures in my future classroom."

Implications for Future Studies

This study investigated how focused gross motor movement can improve behavior during direct instruction on kindergarten students. Based on the results of this study, more research that focuses on the link between movement and engagement is needed. Another finding within this study focuses on the university teacher

candidates who participated in the motor lab experiment, who learned that they gained confidence in their ability to manage a classroom while learning new strategies and techniques for teaching and classroom management from their observation of Ms. Storjohann. Many stated that they felt more confident in the teaching component of their Math Methods course because of the time spent observing and helping with the motor lab in Ms. Storjohann's classroom. University teaching programs can help foster pre-service teachers' collective efficacy through this type of experimental research (Webster, Erwin & Parks, 2013). One noted limitation of this study is the duration of implementation of the motor lab for five months. Ideally, researchers could plan a full year of mobile motor lab use.

One benefit of the purchase of a mobile motor lab is that it can be collected and relocated to another school with ease. The following school year, Ms. Storjohann successfully implemented a motor lab in a spare classroom, in which all teachers were able to access. She showed the teachers in her building how to use the equipment and set up a rotation schedule for each grade. Due to her willingness to implement new ideas into her classroom and to share her lessons and activities with others in her school, Ms. Storjohann was District Teacher of the Year the following year.

Purpose

The purpose of this study is for the classroom teacher and the pre-service teachers to observe kindergarten students (n=24) as they facilitate a mobile motor lab in a kindergarten classroom, watching for changes in the ability of gross motor skills in students and their ability to focus during classroom activities.

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