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The Impact of Physical Movement on Academic Learning

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The Impact of Physical Movement on Academic Learning

by

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Chapter 1: Purpose of the Starred Paper

In recent years, much research has been conducted in the area of incorporating learning styles into the classroom. One learning style in particular is the integration and incorporation of physical movement in the elementary classroom. Educational activities occurring simultaneously with physical movement have been shown in numerous studies to likely influence academic achievement (Beaudoin & Johnston, 2011; Holt, Bartee & Heelan, 2013; Kercood & Banda, 2012; Reed et al., 2010; Shoval, 2011; Trost, Fees & Dzewaltowski, 2008; Van Osdol, Johnson & Geiger, 1974). The purpose of my review was to find out how learning activities of this kind will promote high achievement for all students in my first grade classroom.

Significance of the Study

Both teachers and students are constantly assessed in education. We are in the business of collecting data to document academic achievement. Are students achieving their academic potential? Are students meeting all the state and national standards? Are teachers being effective in their instruction of the curriculum? Do teachers have enough resources and support to incorporate quality programs into their schools so students are set up to achieve success?

In this age of constant assessment, many schools are cutting “extra” classes such as physical education, music, art, and before/after school activities to incorporate more and more curricula content covered in the state and national assessments. In my paper, I hope to introduce and learn that for young children in grades kindergarten through third grade, physical movement activities are *essential* and likely to *increase* student academic achievement. It should be incorporated into core subjects, not eliminated.

Research Question

In an effort to understand the correlation between physical activities and learning, I explored the literature that addresses one research question: How do physical movement activities affect students' academic achievement in an elementary school setting?

Definition of Terms

As I conduct my review of the literature it is important to understand the terms found in my review; in order to do this, I need to define the following terms as follows:

Cooperative learning occurs when students work together in small heterogeneous groups performing group tasks set by the teacher (Shoval & Shulruf, 2011) such as performing experiments, demonstrating ideas, or helping and talking to each other.

Fluid intelligence measures a given ability to reason quickly and abstractly. It is not dependent on previously learned knowledge (Reed et al., 2010).

Mindful (purposeful) movement: physical movement activities that directly relate to academic content. It is the opposite of “movement for the sake of movement” and not *Incidental Movement*, which is not directly from learning, but movement that occurs as a result of active learning (Shoval, 2011).

Moderate-to-vigorous physical activity (MVPA): a scale used to determine the physical activity level of a given student or group of students (Trost et al., 2008). If an activity is of low intensity such as walking, a lower MVPA score is given. If an activity is a higher intensity, more vigorous activity such as running, the MVPA score will be higher.

Pedometer is a small electronic device that measures the number of steps a person takes. A pedometer is a practical tool to assess physical activity because it is inexpensive, easy to use,

gives immediate feedback, enables children to understand the amount of physical activity, and encourages teachers to monitor their own physical activity (Robinson & Wadsworth, 2010).

Physical activity (PA) and/or movement: changing the position or parts of the body, or the location of the whole body. (Holt et al., 2013).

Chapter 2: Review of the Literature

To introduce my literature review, I organized my research by reading various topics related to physical education and academic achievement in classrooms. Some of the topics I will discuss are brain activity, mindful movement versus non-mindful movement, types of movement, students with special needs, and feedback on physical movement programs implemented across schools in our country.

Brain Activity: How the Brain Learns

Jensen (2000) wrote, “Traditional seatwork engages less of the brain. If you want your learners to remember what they are learning, get them involved: Get them moving. Start ‘playing’ more and ‘working” less’ (p. 6). Although I located research about the integration of physical movement in schools, there is very little research I have found so far that explains the ‘science’ behind how the brain works with regard to movement and learning.

According to Jensen (2000), “Over the past decade, we have identified pathways that travel from the cerebellum to brain areas involved with attention, memory, spatial guidance, rhythm, perception, and body positioning. This suggests that it’s not just our conscious mind telling our ‘brain’s engine’ what to do, but the reverse is also true” (p. 22). He also mentioned “Physical activity has also been known to stimulate the release of epinephrine and norepinephrine (adrenaline) enabling children to become more alert and ready to learn” (p. 29). In his research he described the connection between movement and the cognitive abilities of children. This implies that in order for students to use their maximum brain potential, it is necessary to include movement with it.

Mindful Movement versus Non-Mindful Movement

Prior to discussing different physical movement strategies implemented in research studies, the term movement needs to be defined. Movement, in my own words, is the physical change of our bodies with itself or the environment around it. It includes twisting, shaking, stretching, wiggling different parts of the body, as well as moving or interacting with the environment around it. Researchers have two important types of movement: Mindful movement (sometimes referred to as purposeful movement) and non-mindful movement (Beaudoin & Johnston, 2011; Holt et al., 2013; Kercood & Banda, 2012; Reed et al., 2010; Shoval, 2011; Trost et al., 2008; Van Osdol et al., 1974).

Mindful movement integrates physical movement activities directly with learning objects, including language arts, math, science, and social studies. “In mindful movement, children form a circle with their bodies in order to learn about a circle” (Shoval, 2011, p. 454). It is not movement just for movement’s sake. Another clear example “...students walking around the edge of an object to understand the concept of perimeter or moving their hands to demonstrate how the planets revolve around the sun” (Beaudoin & Johnston, 2011, pp. 82-83). In my literature study thus far, I have noticed that the majority of mindful movement activities were incorporated into math and language arts, and less in other subjects (Beaudoin & Johnston, 2011; Holt et al., 2013; Kercood & Banda, 2012; Reed et al., 2010; Shoval, 2011; Trost, et al. 2008; Van Osdol et al., 1974). A final, and very important aspect of mindful movement is that no special attention is given to the quality of the movement (Shoval, 2011). For example, if a student is practicing making the letter “X” with his body by completing jumping jacks, no assessment is given on mistakes on the actual exercise of the jumping jack, but rather the focus is

on the academic content. “When the teacher turns the children’s chosen movement into mindful movement through organizing their learning environment and directing their activities, he/she also changes movement into a useful tool for attaining learning goals” (Shoval, Sharir, & Shulruf, 2014, p. 282),

In contrast, non-mindful movement is physical activity that is not directly related to academic content. Examples of non-mindful movement are: going for a walk or run, taking a stretch break, yoga, sitting on an exercise ball instead of a chair, and doodling. Non-mindful movement strategies in the classroom have been studied as well, and I am interested to see which type has more of an impact on academic achievement.

When reading previous studies, it is vital that I do not confuse mindful and non-mindful movement with incidental movement. As Shoval (2011) succinctly explains in her study, “[Incidental movement] which is not directed at learning, but occurs as a result of active learning” (p. 454).

To summarize, mindful movement *directly* uses movement activities to teach and learn, whereas non-mindful movement does not. In the next section I describe different ways in which physical activity has been incorporated into classrooms.

Types of Movement

In this literature review, I describe the findings of seven studies that examine the role of movement in educational outcomes (Beaudoin & Johnston, 2011; Holt et al., 2013; Kercood & Banda, 2012; Reed et al., 2010; Shoval, 2011; Trost et al., 2008; Van Osdol et al., 1974). The majority of mindful movement activities were incorporated into math and language arts more than other subjects. Three types of movement are explored in this section: individual movement

with objects, individual movement without objects and cooperative movement within a group of students.

Individual Movement with Objects

There are an infinite amount of ways objects can be integrated into the classroom, both in mindful movement and non-mindful movement activities. Trost et al. (2008) identified some of these activities as “counting and number-recognition games using scarves and balloons and music-based chasing and imagination games addressing concepts in language arts, science, social studies, and nutrition education” (p. 90). Others include yoga or therapy balls, doodling, and the use of pedometers and accelerometers in the classroom.

Yoga/therapy balls. In classrooms where yoga exercise balls are used, they usually take the place of student or teacher chairs. Children sit on them while listening to instruction from the teacher. The thought behind this intervention is that students will engage their core and practice their balance which is healthier for the body, and possibly healthier for the brain. Kercood and Banda (2012) studied listening comprehension with and without the use of yoga balls. When the student participants were asked about their thoughts on the use of the ball, they reported they were more awake and paid attention when sitting on the exercise ball. One can infer that the more students “stay awake and pay attention,” the more they will increase their academic achievement.

Doodling. The yoga exercise ball was an example of a gross motor movement strategy. Kercood and Banda (2012) examined the effects of a fine motor skill movement compared to gross motor skill movements. Students were allowed to free-doodle during a listening comprehension task. At the end of the study, students were asked which of the two interventions they preferred, and almost all of them preferred doodling (Kercood & Banda, 2012). The study

also found that students “took less time to complete the tasks and had improved performance during both the intervention activities compared to the baseline” (p. 29).

Pedometers and accelerometers. Pedometers and accelerometers are two versions of the exact same tool. They are small devices that are attached to the right hip and above the knee of a person to count the number of steps he or she takes in a specific amount of time. Accelerometers are a bit newer and have slightly more accurate results. Educational studies have incorporated the use of both tools into classrooms to physically and quantitatively measure the level of physical activity exerted for each individual student or teacher. “A pedometer is a practical tool to assess physical activity because it is inexpensive, easy to use, gives immediate feedback, enables children to understand the amount of physical activity and encourages teachers to monitor their own physical activity” (Robinson & Wadsworth, 2010, p. 95).

One significant advantage to using an accelerometer or pedometer in the classroom is the simple fact that, on average, children are active and accumulate physical activity throughout the day much more compared to adults. This is a very simple and effective way to collect data.

Pedometer and accelerometer data result in a number that is referred to as Moderate to Vigorous Physical Activity (MVPA) level. Trost et al. (2008) used pedometers to motivate students to increase their physical activity levels, and found that “When only classroom time was examined, preschoolers in the intervention class exhibited significantly higher levels of MVPA than the controls during weeks 5 and 6 and weeks 7 and 8” (p. 96). The authors concluded this tool could help children become more aware of their current MVPA level, and motivate them each day to “beat” their previous day’s score.

To conclude this section on integrating movement with objects in the classroom, it is important to remember the results of these studies should be taken as only one important piece of

evidence of a bigger picture. This is only one factor on whether it is feasible or not to include in any particular school. Other important factors should include cost, training and implementation time, ongoing professional development, and so forth. Kercood and Banda (2012) recommended that future research include feedback from educators or school professionals as it is implemented in general, inclusive or remedial classrooms in all grade levels.

Individual Movement without Objects

Some physical movement implementation strategies do not require the use of objects such as the yoga balls, pedometers, and educational tools previously mentioned. Many schools opt to find ways to incorporate physical activity inside classrooms using no objects.

Walking/running. Reed et al. (2010) conducted a study with third grade students and compared a group of students with integrated physical activity e.g., running, hopping, walking into the core language arts, math, and social studies curricula to a group who did not have integrated physical activity. Participants engaged in physical activity approximately 30 minutes a day, 3 days a week. Results revealed that aerobically trained or physically active participants performed significantly better on the fluid intelligence task than participants in a control group. The authors concluded that movement is an essential element in promoting the cognitive development of elementary-age children.

Although the Reed et al. (2010) study supported walking and running in school for students to increase achievement, Holt et al. (2013) noted that teachers were concerned about the length of time this process required because of the need to clothe properly and provide additional bathroom and water breaks. Holt et al. (2013) also noted although they were moving, it was not “of MVPA intensities” (p. 485). Significant differences were found between the curriculum-based lessons combined with another physical activity session or walk/run period and other

movement activities or no extra activity” (p. 485). Based on this statement, a researcher has to decide which is more important or relevant: The intensity of the movement or the academic results?

Extra recess. Extra recess is similar to the walking/running strategy but it is usually completed outside and allows students more free-choice in their ability to move. Trost et al. (2008) found that time outdoors contributes to greater physical activity in preschool children. In states with more temperate weather, this may require less time to implement.

Cooperative Group Learning

Cooperative learning is when two or more people work together toward a certain task and physical movement activities can be easily incorporated into cooperative learning sessions.

Shoval (2011) suggested in her research,

Cooperative learning based on mindful movement may be better suited to children in the first few years of elementary school since movement is something every child knows how to perform independently in the playground or in the schoolyard, and therefore a program based on the children’s experience would enable them to benefit from learning in a cooperative group. (p. 455)

In Shoval’s research with cooperative movement and physical activity, she found a positive correlation between academic achievement and cooperative learning.

Students with Special Needs

According to the National Association for the Education of Young Children (NAEYC 2004), classroom instruction should be developmentally and instructionally appropriate to the learner. Robinson and Wadsworth (2010) demonstrated that movement activities can be easily adapted for students regardless of academic ability, physical ability, and social/emotional ability. In fact, some researchers contend students with special needs may benefit more from integrating physical movement into their academics than general education students.

Below average learners. Van Osdol et al. (1974) performed a study with students who were classified as learning disabled. Students participated in a program called Total Body Movement (after they discontinued their formal reading program). Results indicated that at the end of the semester students in the experimental group had higher reading levels than students in the control group. In other words, students who participated in a movement-based reading curriculum performed at a more advanced level compared to the students who received more traditional means of instruction.

In a similar study, Shoal and Shulruf (2011) found greater effects of movement among the lowest third of academic achievers. They speculated that lower achievers benefited more from including movement activity because it helped them overcome the language barriers and improved social interaction and social-cognitive conflicts.

Gifted and talented learners. Gifted and talented students can also be identified and receive services through special education. However, I could not find movement research with this population. Shoal and Shulruf (2011) contended all students need to have physical movement programs in the classroom and that no child be excluded from this opportunity. I wonder if through the use of movement, the gifted and talented students are encouraged to problem-solve and expand their thinking physically, and not just the traditional way of pencil and paper classwork?

Feedback on Physical Movement Programs

In the past few years, many types of movement-based programs, policies, initiatives, and curriculums have been created and placed into schools across the world. Through these pilot programs, researchers have gathered a variety of feedback regarding these programs to hopefully

improve them. This section discusses some of the feedback given by the teachers and students regarding these programs.

Teacher Feedback

In the past few years, many types of movement-based programs, policies, initiatives, and curriculums have been created and placed into schools across the world. Through these pilot programs, researchers have gathered a variety of feedback regarding these programs to hopefully improve them. This section discusses some of the feedback given by the teachers and students regarding these programs.

Holt et al. (2013) administered a questionnaire to teachers regarding their district's mandatory policy that integrated an additional 20 minutes of physical activity each day outside of gym and recess. The data was gathered to examine how teachers met the policy set by their district. Holt et al. found that classroom teachers preferred to use curriculum-based lessons rather than relying on a walk or run session. Teachers identified barriers such as lack of time in the day, weather-related difficulties, and a lack of administrative support. The greatest barrier was the lack of opportunities for professional development and training on the incorporation of physical activity in a classroom setting. If teachers do not feel trained, or if they do not have the proper resources to implement this new policy, it is less likely they will complete it successfully. To address this problem, Holt et al. provided ongoing professional development sessions to teachers during the second half of the school year. At the end of the year, they discovered that teachers who attended the professional development sessions had a higher implementation rate.

Trost et al. (2008) implemented a movement curriculum called "Move and Learn" and tested it for efficacy and feasibility in a United States preschool. Teachers were to include at least two mindful movement activities (directly related to curriculum) that lasted a minimum 10

minutes per day. Trost et al. found that 74% of the activities met the 10-minute requirement. Some movement experiences were ended prematurely when other activities had to take priority, (e.g., a fire drill, a guest speaker, or a planned field trip). Even though the time requirement was not met more than 25% of the time, data revealed that the “Move and Learn” experiences were rated favorably. They also reported improved attention-to-task behavior, increased student motivation and improved academic achievement scores.

Student Feedback

In a study by Shoval et al. (2014), children showed a preference for gross motor movement when given a choice between traditional seatwork and movement activities. This may be developmentally normal and appropriate for young children who want to move and learn and be active compared to their adult counterparts. Through the use of movement and learning, they do not necessarily have to rely on the help of adults. They also do not have to rely solely on verbal communication to explain their sometimes abstract ideas.

When mindful movement was integrated into one high school algebra classroom, Beaudoin and Johnston (2011) found that students greatly enjoyed the lesson. When compared to a control class, mindful movement resulted in greater increases in student outcomes and attitudes. It is important to keep in mind that students may have possibly just liked the change in routine, and therefore skewed the results to make the movement activities seem more enjoyable.

Robinson and Wadsworth (2010) concluded from their study that students enjoyed the use of pedometers and that the pedometers did not distract from learning. If students are enjoying themselves, they are more motivated to complete the work, and therefore more likely to achieve higher academically on assessments.

Vazou, Gavrilou, Mamalaki, Papanastasiou, and Sioumala (2012) also reported that students found physical activity to be motivating and enjoyable. If students are motivated by physical movement activities in the classroom, it should provide an increase in student's academic achievement.

Chapter 3: Recommendations

My findings summarize a growing body of evidence indicating a relationship between students' academic achievement and physical activity. By examining this topic, I am able to look at the physical education and academic performance research and gain a better understanding of the progress made in the field throughout the last 50 years. While reading these studies I often found myself asking questions about how I could or would experience each particular study in my own classroom. Every school is different and prioritizes different aspects of education. One important question regarding physical activity studies was to have researchers decide which was more relevant: the intensity of the movement or the academic results? Some studies focused more on intensity of the movement and other studies focused more on the end academic result. I also asked myself another important question: Does it challenge and reach *all* students, regardless of gender, ethnicity, socioeconomic status, and intellectual ability? Everhart, Dimon, Stone, Desmond and Casilio (2012) recommended that schools devote more time for structured physical activity for all students that is developmentally appropriate in the least restrictive environment.

Finally I asked myself: How would I feel if I were the researcher or teacher in this study? Do I have a voice in the matter? Am I able to make decisions or am I simply being told when and what to implement with minimal or no training to assist me? I can only imagine the stress, extra work and burden placed on teachers and staff if an initiative in my school began regarding implementing physical movement. Thankfully, most studies took this into consideration and provided many school staff involved with the proper materials, curriculum, training, and support to be successful.

What Each School Can Do

What can I do in my school or classroom to implement more physical movement in the classroom? My school in central Minnesota is much like many schools across the country.

There are many ways each teacher or school could begin to use more purposeful physical activity to potentially increase academic achievement for its students. Based on my literature review, I outlined a few of the most frequently suggested strategies.

Types of Movement

One of the first decisions a teacher or school needs to make is to decide what type of movement or physical activity he or she wants to use. There are a wide variety of types including mindful movement, non-mindful movement, movement with objects, movement without objects, individual movement or cooperative learning group movement, and so forth. A teacher's preference or comfort level is only one variable in this decision. Other variables to consider would be funding. Does the school have the funds or resources available to purchase a curriculum, exercise bands, balls, or pedometers? Where could these items be purchased? Another variable to consider is the availability of resources. Where should a teacher look to create or find mindful movement lessons? These are just a few questions to consider to start the process.

Importance of Physical Education Classes

As a result of No Child Left Behind, many schools had to make difficult decisions regarding how to boost their children's academic opportunities for learning. Many schools chose to focus more of the school day on core subjects such as language arts, math, science, and social studies, which left significantly less time for art, music, and physical education classes. Some

schools cut these programs completely. These decisions were based on the belief that more time in core instruction would result in more academic success.

In the context of my research study, physical activity is not viewed as antagonistic to academic success, but actually research has suggested it improves it. Kall, Nilsson, and Linden (2014) confirmed this when they stated, “School physical education is declining in many countries due to schools focusing away from physical education and toward academics. Studies suggest that cutting physical education classes to focus on academics might be counterproductive” (p. 479). Therefore, schools should prioritize physical education classes as an easy way to increase academic success.

Importance of Physical Activity Outside of Physical Education Classes

There are many other parts of the school day where physical movement and activity can be increased for students. Teachers and school staff can advocate for more movement interventions, strategies and programs outside of a gymnasium throughout the day. This could potentially be met through increased physical movement in grade level classes, encouraging longer and more active recess, as well as maximizing before and after school time.

Teacher Involvement, Training, and Feedback

Active and intentional involvement from teachers such as organizing, modeling, and encouraging, should be an integral part of any successful program meant to enhance each student’s physical activity and learning (Kirk, Vizcarra, Looney, & Kirk, 2014). If the staff are involved in the process, they will likely be more invested and implement the physical activity with a higher rate of success than if they did not feel involved or properly trained. Training on the strategy or program needs to happen prior to the start of the implementation of the program,

include regular check-ins during the school year and wrap up with a summative training at the end of the year that includes a feedback portion. Using feedback allows the program or strategy to improve, find challenges and celebrations, and collect data.

Changing School Policy

My final suggestion for what schools can do to implement more physical activity to increase academic success includes starting to change the shift in local school policy. Castelli et al. (2014) recommended that the findings of movement research be given to teachers and administrators—who are the ones who need it the most. Researchers must begin to translate scientific findings for school personnel and policy-makers. They have the potential to make changes not just at a local level, but school policy could drastically redesign the school day. This is where big and significant changes could happen.

Recommendations for Future Research

Although more research has been conducted on this topic during the last 5 to 10 years there are many aspects of this field not yet studied in depth. My recommendations for future research includes the following areas: scientific study of the brain and how it functions related to learning, teacher feedback, and student motivation related to physical movement activities in education.

Brain Research

The brain is a fascinating object in which its capabilities are unknown in many ways. Jensen (2000) did not provide data to support his assertions and the studies I reviewed did not address brain function. Continued research on the function and changes in the brain structure that lead to learning and cognitive performance is critical for understanding how to maximize brain and learning among children.

Researchers then need to apply what the research says to a real world setting, such as in a school. This will bridge the gap between how the brain functions to how a student could actually improve the process of learning.

Teacher Feedback

According to Vazou and Smiley-Oyen (2014), teachers may be reluctant to include physical activity because they fear it will take time away from instruction and interfere with academic performance. However, the vast majority of research out there confirms neither of these apprehensions are true. Feedback from educators and school professionals is one of the most influential variables to implementing success in a school environment. It is essential to have all staff members on board, but what is the best way to do that?

Physical Activity and Student Motivation

Finally, more research needs to be conducted regarding student motivation and how it relates to physical activity. Is there a positive correlation between the two variables? If so, how does this impact the academic achievement rates in the aforementioned studies? If students are engaged and enjoying themselves (through the use of physical movement activities), they are more motivated to complete the work and, therefore, more likely to achieve higher academically on assessments. Participants may have had higher scores after physical activity because they enjoyed it, and as a result were more engaged when traditional instruction was used. Does this variable need to be studied further? Kall et al. (2013), concluded physical activity might improve mental health and students' self-efficacy and alleviate stress which would positively affect school achievement. So is it truly the physical movement that improves an increase in academic outcomes, or a combination of the other variables? Only further research and continued study of the brain and how it functions will truly tell.

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