Integration: Helping to Get Our Kids Moving and Learning

Erin M. Hall

Abstract

Over the past decade, schools and teachers alike have had increased pressure placed upon them with respect to student academic performance (Maeda & Murata, 2004). As a result of this focus targeting academic performance on standardized tests, the quality and quantity of elementary school based physical education programs are slowly dwindling. However, there is hope within our grasp. Integration, defined as combining two or more subject areas to help students understand and learn through different modes, is neither a new topic nor discovery. Research on physical activity and physical fitness has provided strong evidence for integration as a major teaching method to help increase student learning (Blaydes, 2000; California Department of Education, 2005; Michaud & Wild, 1991; NASPE, 2002). Integration is not only suspected of enhancing student academic performance, it also allows for the invaluable structured physical education curriculum to be taught as well as benefited by all students.

Our Reality

Over the past decade, schools and teachers alike have had increased pressure placed upon them with respect to student academic performance (Maeda & Murata, 2004). The federal initiative passed in 2001, No Child Left Behind Act, has been the most recent challenge placed in front of them. The reality of this scrutinized focus toward academic performance, is that the quality and quantity of elementary school based physical education programs are slowly dwindling (e.g., fewer elementary physical education specialists and less time participating in structured physical education). "As states conduct standardized tests to hold schools and students accountable, content that is not tested, such as physical education, has become a lower priority" (National Association for Sport and Physical Education [NASPE] & American Heart Association [AHA], 2006, p.6). Certified/licensed elementary physical education teachers are only required in 28 states. Thirty-one states grant temporary/emergency certificates to teach elementary school physical education. Thirty-three states allow elementary physical education teachers to be hired using alternative certification (NASPE & AHA). Only 8% of elementary schools provide daily physical education (e.g., 150 minutes per week) for the entire school year (Burgeson, Wechsler, Brener, Young, & Spain, 2001). Laws, mandates and administration policies are limiting students' participation in physical education, not parents and teachers. In fact, "more than 75% of parents and teachers believe that school boards should not eliminate physical education for budgetary reasons or because of the need to meet stricter academic standards" (NASPE & AHA, p. 1).

When the data pertaining to elementary physical education programs highlighted above is considered along with the general health practices seen in the US today, the challenges facing school physical education programs appear even greater. A report from the U.S. Department of Health and Human Services (2000) indicates that reduced physical activity levels and an increase in poor eating habits and sedentary lifestyles in the United States have been a major cause of the increased prevalence of obesity leading to type II diabetes, high blood pressure, heart disease, and other negative effects on one's health which are all preventable causes of premature death.

Integration to the Rescue

How can we help our students avoid this downward spiral? There is hope within our grasp. Integration, defined as combining two or more subject areas to help students understand and learn through different modes, is neither a new topic nor discovery. Research on physical activity and physical fitness has provided strong evidence for integration as a major teaching method to help increase student learning (Blaydes, 2000; California Department of Education, 2005; Michaud & Wild, 1991; NASPE, 2002). Instead of teachers cutting physical education out of their day to fit in all of their "core" subject matter, they can integrate it to reinforce subject matter and allow students to get daily physical activity. Jensen (2005) supports daily quality physical education and explains how increased physical activity can impact a student's performance and elevate test scores. Dwyer, Sallis, Blizzard, Lazarus, and Dean (2001) have also conducted research stating that exercise improves classroom behavior and academic performance. Integration not only allows us to reinforce other subject matter, it allows us to do it in a way that "provides greater access to the curriculum helping students to excel in learning" (Mitchel & Kernodle, 2004, p. 31), while increasing the much needed amount of quality structured physical activity students receive (i.e., physical education). Physical Education refers to a structured physical activity curriculum that meets state and national standards. Physical activity, on the other hand, refers to movements of the body in general, following no specific curriculum.

Through the research of Coker (1996), Gardner (1983, 1993), and Kolb (1984), a wide spectrum of learning styles has been identified. Individuals process and retain information in different ways and demonstrate intellectual ability differently. As teachers, we have to remember that each student we encounter is a unique individual with unique learning needs. The more we know about each child, the better we can be at designing lesson plans that best accommodate all of our students (Wolfe, 2001). Physical education is a unique subject matter in that it allows us to teach using verbal instruction, visual demonstrations and kinesthetic movement. Integrating physical education and "core" subject matter, allows for multiple learning styles to be targeted. This increases the opportunities students have to use the various learning styles that best fit them to take in more information and allow for learning to occur.

Movement as the Foundation to Learning

As stated previously, the current brain research supports the idea of movement integration with other subject matter, citing many benefits for our students (Blaydes, 2000; California Department of Education, 2005; Michaud & Wild, 1991; NASPE, 2002). One benefit includes the foundation for how we learn information. For learning to occur, new information must be engrained within a student's neural networks (Mears, 2003). The process by which this engraining of information occurs appears to be achieved through movement (Hannaford, 1995). As the sensory fibers are "recruited" during movement, they carry impulses from the muscles to the brain. It is at this moment that the engraining process occurs. The more muscles activated while learning new information, the stronger these engrained pieces of information will become (Mears). When introduced in this way, the more muscle groups and fibers recruited during physical activities integrated with subject matter concepts, the stronger and more concrete the learning. Middleton and Strick (1994) support this theory with their research identifying the part of the brain that processes movement, the cerebellum, as the same part of the brain that processes learning. Thus, when the movement part of the brain is stimulated, so is the learning part of the brain.

Brain Chemistry 101

Many benefits to the brain have been directly linked to being physically active. It has been found that exercise triggers the production and flow of BDNF (a brain-derived neurotrophic

factor) (Kesslak, Patrick, So, Cotman, & Gomez-Pinilla, 1998; Kinoshita, 1997). BDNF is a chemical that helps neurons communicate with one another. With increased BDNF circulating in the brain, a greater amount of neurons are able to exchange and retain information, enabling individuals to understand, comprehend, remember, and retrieve more information and at a quicker rate. Blaydes (2000), found that students who sit for longer than twenty minutes experience a decrease in the flow of BDNF. In contrast, physical movement, such as stretching every 20 minutes in the classroom, can help stimulate the BDNF in a child's brain and help learning occur more easily. This being said, structured physical education and being physically active, in general, can help stimulate learning by increasing the flow of BDNF within our student's brain, which further lends support for integration.

Food for Thought

Another benefit of physical activity is an increased blood flow to the brain. With the increased functioning of the cardiovascular system that results from regular exercise, more blood volume is circulated throughout the entire body. This increased blood flow helps provide more nutrients, namely glucose and oxygen, to the brain. The brain makes up approximately 2% of an adult's weight; however it consumes about 20% of the body's energy (Jensen, 2005). Without the oxygen– rich blood flow to the brain the body loses consciousness in seconds. Higher levels of attention, mental functioning, and healing are linked to better quality air (i.e., less carbon dioxide, more oxygen) (Jensen). Structured physical education increases physical activity, which in turn, increases blood flow and oxygen delivery, thus increasing mental functioning.

Stress Kills

Yet another benefit of physical activity on the brain and body is its stress reducing capability. Stress triggers the adrenal glands to produce chemicals, one of which is called cortisol. With the presence of cortisol, the brain is less capable of planning, judging, problem solving, and completing other higher-order skills (Jensen, 2000, 2005; Leamnson, 2000). Prolonged high levels of cortisol lead to the death of brain cells (Ratey, 1996; Sapolsky, 1992; Vincent, 1990), and reduce the number of brain cells produced (Gould, McEwen, Tanapat, Galea, & Fuchs, 1997). Through the use of exercise, we can regulate the level of cortisol produced, reducing the number of brain cells that are disrupted and destroyed. By doing so, we allow for increased brain function. In fact, researchers have reported an increase in the base-line of new neuron growth due to exercise (Van Praag, Kempermann, & Gage, 1999). With the presence of more neurons, increased ability to learn may result.

Academics and Physical Fitness

Finally, as reported in recent studies by the California Department of Education (2005), and NASPE (2002), a distinct relationship between academic achievement and the physical fitness of California's public school students exists. These research studies display individually matched reading and mathematics scores from the spring 2001 and 2004 administration of the Stanford Achievement Test, Ninth Edition (SAT-9), and the California Standards Tests (CSTs) respectively, with the results of the state-mandated physical fitness test, FITNESSGRAM, given in 2001 and 2004 to students in grades five, seven, and nine. The results revealed a significant relationship between the two types of scores that were matched (California Department of Education, 2005; NASPE, 2002). Specifically, it was found that those students who met minimum fitness levels in three or more physical fitness areas on the FITNESSGRAM physical fitness test scored high on the math and reading sections of the SAT-9 and CST. Whereas, those students who failed to meet the minimum physical fitness levels were also found to score low on the math and reading sections of the SAT-9 and CST.

However, we should be cautiously optimistic with these recent research findings and reports.

Learning is not done in isolation, but in fact is multifaceted, in which there are numerous factors and components that affect learning. Physical education and being physically active are only one of the many factors that may have an effect on academic performance. Nevertheless, the current research findings provide strong support for integrating structured physical education with other subject matter to enhance learning. As Physical Educators, we should not abandon our own curriculum to reinforce classroom subject matter concepts. We must stand fast and teach our curriculum while adding in the classroom subject matter as a reinforcer.

Remember, we are striving to teach individuals how to be skillful, knowledgeable and confident movers promoting a healthy, active lifestyle throughout their lifetime (NASPE, 1995; NASPE & AHA, 2006).

> The priorities in education continue to be on the development of the mind, often to the detriment of the body. A balance between both entities appears to be a logical goal since both are needed and used throughout one's lifetime (Maeda & Murata, 2004, p. 46). Also, when learning experiences incorporate movement, learning is more efficient, comprehension is clearer, thought processes are better connected, and learning is fun (Leppo & Davis, 2005, p. 16).

This is why we should use integrative teaching methods. More specifically, this is why classroom teachers should integrate their lessons with the structured physical education curriculum, and vice versa. This teaching method is even more critical when the elementary school does not have a physical education specialist on hand to ensure children are receiving the recommended, much-needed, and truly beneficial structured daily physical activity.

Integrated Resources

The following is a list of integration lesson plan resources that are very beneficial and useful for those wanting to integrate different subject matter into their physical education curriculum. Use these materials as is or add your own creative twists and create new and improved lesson plans that specifically fit your curriculum and your students' interests.

Books with Lesson Plans

Blaydes, J. (2000). *Thinking on your feet*. Richardson, TX: Action Based Learning.

Cone, T., Werner, P., Cone, S., & Woods, A. (1998). *Interdisciplinary teaching through physical education*. Champaign, IL: Human Kinetics.

Hastie, P., & Martin, E. (2006). *Teaching elementary physical education: Strategies for the classroom teacher*. Pearson Education, Inc. publishing as Benjamin Cummings: San Francisco, CA.

Human Kinetics, & Pettifor, B. (1999). *Physical education methods for the classroom teachers*. Champaign, IL: Human Kinetics.

Kovar, S., Combs, C., Campbell, K., Napper-Owen, G., & Worrell, V. (2007). *Elementary classroom teachers as movement educators (2nd ed.)*. New York, NY: McGraw Hill.

Purcell, T. (1994). *Teaching children dance: Becoming a master teacher*. Champaign, IL: Human Kinetics.

Ratliffe, T., & Ratliffe, L. (1994). *Teaching children fitness: Becoming a master teacher*. Champaign, IL: Human Kinetics.

Articles with Lesson Plans

Math.

Usnick, V., Johnson, R. L., & White, N. (2003, July). Connecting physical education and math. *Teaching Elementary Physical Education*, 20-23.

Language Arts.

Cone, S., & Cone, T. (2001, July). Language arts and physical education: A natural connection. *Teaching Elementary Physical Education*, 14-17.

Mears, B. (2003, September). The ABCs of effective reading integration: Pre k through first grade. *Teaching Elementary Physical Education*, 36-39.

Schumacher, J. (1999). Integrating physical education and language arts: What literature do physical education specialists use, and how are physical education and language arts integrated? ERIC, 79.

Williams, L. (2001, January). Creative writing is a moving experience! *Teaching Elementary Physical Education*, 25-26.

Science.

Ayers, S., & Wilmoth, C. (2003, July). Integrating scientific subdisciplinary concepts into physical education. *Teaching Elementary Physical Education*, 10-14.

Buchanan, A.M., Howard, C., Martin, E., Williams, L., Childress, R., Bedsole, B., et al. (2002). Integrating elementary physical education and science: A cooperative problem-solving approach. *JOPERD, 73*(2), 31-36.

Donnelly, F. C. (1999, July). Connect with classroom teachers: Promote learning on the move! *Teaching Elementary Physical Education, 27-33.*

Hill, C., & Sharland, J.(2001, November). Brown school "year of science" field day: The science of sports. *Teaching Elementary Physical Education*, 6-8.

Music.

Barney, D., & Mauch, L. (2003, November). Jump bands: Success and fun with rhythms. *Teaching Elementary Physical Education, 14-16.*

Donnelly, F. C. (1999, July). Connect with classroom teachers: Promote learning on the move! Teaching Elementary Physical Education, 27-33.

Pica, R. (1999, July). Music and the movement program. *Teaching Elementary Physical Education*, 32-33.

Social Studies.

Donnelly, F. C. (1999, July). Connect with classroom teachers: Promote learning on the move! *Teaching Elementary Physical Education, 27-33.*

Gallavan, N., & Muraoka, D. (2003, July). Ten concepts for integrating social studies and physical education. *Teaching Elementary Physical Education*, 16-19.

REFERENCES

Blaydes, J. (2000). *Action based learning—Thinking on your feet: 110+ activities that make learning a ... moving experience!* Richardson, TX: Action Based Learning.

Burgeson, C.R., Wechsler, H., Brener, N.D., Young, J.C., & Spain, C.G. (2001). Physical education and activity: Results from the School Health Policies and Programs Study, 2000. *Journal of School Health, 71*(7), 279-293.

California Department of Education (2005, March 3). *A study of the relationship between physical fitness and academic achievement in California using 2004 test results*. Retrieved March 3, 2005, from http://www.cde.ca.gov/ta/tg/pf/documents/2004pftresults.doc

Coker, C.A. (1996). Accommodating students' learning styles in physical education. *JOPERD*, 67(9), 66-68.

Dwyer, T., Sallis, J., Blizzard, L., Lazarus, R., & Dean, K. (2001). Relation of academic performance to physical activity and fitness in children. *Pediatric Exercise Science*, *13*, 225-237.

Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York, NY: Basic Books.

Gardner, H. (1993). *Multiple intelligences: The theory in practice*. New York, NY: Basic Books.

Gould, E., McEwen, B., Tanapat, P., Galea, L., & Fuchs, E. (1997). Neurogenesis in the dentate gyrus of the adult tree shrew is regulated by psychosocial stress and NMDA receptor activation. *Journal of Neuroscience, 17*, 2492-2498.

Hannaford, C. (1995). *Smart moves: Why learning is not all in your head*. Arlington, VA: Great Ocean Publishers, Inc.

Jensen, E. (2000). *Brain-based learning*. San Diego, CA: The Brain Store.

Jensen, E. (2005). *Teaching with the brain in mind* (2nd ed.). Alexandria, VA: Association of Supervision and Curriculum Development.

Kesslak, J., Patrick, V., So, J., Cotman, C., & Gomez-Pinilla, F. (1998, August). Learning upregulates brain-derived neurotrophic factor messenger ribonucleic acid: A mechanism to facilitate encoding and circuit maintenance. *Behavioral Neuroscience*, *112*(4), 1012-1019.

Kinoshita, H. (1997). Run for your brain's life. *Brain-Work* 7(1), 8.

Kolb, D.A. (1984). *Experimental learning: Experience as the source of learning and development.* Englewood Cliffs, NJ: Prentice-Hall.

Leamnson, R. (2000). Learning as a biological brain change. *Change*, 32(6), 34-40.

Leppo, M., & Davis, D. (2005). Movement opens pathways to learning. *Strategies,* 19(2), 11-16.

Maeda, J.K., & Murata, N.M. (2004). Collaborating with classroom teachers to increase daily physical activity: The GEAR program. *JOPERD, 17(5),* 42-46.

Mears, B. (2003). The ABCs of effective reading integration. *Teaching Elementary Physical Education*, 14(5), 36-39.

Michaud, E., & Wild, R. (1991). *Boost your brain power*. Emmaus, PA: Rodale Press.

Middleton, F., & Strick, P. (1994). Anatomical evidence for cerebellar and basal ganglia involvement in higher cognitive function. *Science*, 266, 458-461.

Mitchel, M., & Kernodle, M. (2004). Using multiple intelligences to teach tennis. *JOPERD*, 75(8), 27-32.

National Association for Sport and Physical Education (1995). *Moving into the future. National standards for physical education: A guide to content and assessment*. Reston, VA: Mosby Publications.

National Association for Sport and Physical Education (2002). New study supports physically fit kids perform better academically. *NASPE News*, 62 (Winter), 16.

National Association for Sport and Physical Education & American Heart Association (2006). 2006 shape of the nation report: Status of physical education in the USA. Reston, VA: National Association for Sport and Physical Education.

Ratey, J. (1996, November). *The care and feeding of the brain*. Paper presented at the Boston Learning and the Brain Conference, Boston, Massachusetts.

Sapolsky, R. (1992). *Stress, the aging brain, and the mechanisms of neuron death*. Cambridge, MA: MIT Press.

U.S. Department of Health and Human Services (2000). *Healthy people 2010*: *Understanding and improving health*. (2nd ed.). Washington, DC: U.S. Government Printing Office.

Van Praag, H., Kempermann, G., & Gage, F.H. (1999, March). Running increases cell proliferation and neurogenesis in the adult mouse dentate gyrus. *Nature Neuroscience, 2*(3), 266-270.

Vincent, J.D. (1990). *The biology of emotions*. Cambridge, MA: Basil Blackwell.

Wolfe, P. (2001). *Brain matters: Translating research into classroom practice*. Alexandria, VA: Association for Supervision and Curriculum Development.

Dr. Erin M. Hall teaches within the Department of Physical Education and Health at California State University, Stanislaus.