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Move, Think, Learn: Incorporating Physical Activity into the College Classroom

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Robust evidence links physical activity to positive cognitive and academic performance outcomes, and engaging students in movement within the classroom has the potential to benefit learners at every age. Offering college students an opportunity to be active in the classroom can enhance learner engagement, promote critical thinking, and increase content understanding and retention. Designed to bridge the gap between research and practice, this article shares specific strategies for movement integration at the college level. These strategies have been used successfully across content areas and class formats and can be modified to match student need and classroom environment. Increasing awareness of active pedagogy among educators has the potential to positively impact adoption and implementation of the practice with the ultimate goal of influencing students' learning experiences and academic success. The purpose of this article is to provide college instructors with practical examples to incorporate movement into the college classroom.

Move, Think, Learn: Incorporating Physical Activity into the College Classroom

Jumping jacks in the classroom? You may think that sounds fine for elementary school students, but out of place in a college course. To the contrary, actively engaging students helps them to think more deeply about course content, and, by adding physical activity to active learning, the cerebral blood flow increases the brain's function and performance (Hillman, Erickson, & Kramer, 2008). As college professors ourselves, we teach a variety of coursework, and we consistently and successfully engage our students in movement. Physically active teaching strategies benefit our instruction by enhancing the classroom climate and our students by facilitating opportunities to think critically, gain multiple perspectives, and reset attention. In addition, a culture of movement within the college classroom provides students with a mechanism to decrease inactivity. College students spend about 30 hours per week in sedentary behavior, primarily during class and while studying (Buckworth & Nigg, 2004). As such, integrating physical activities into the classroom can offer a variety of benefits, making it necessary to both increase faculty awareness of the practice and to provide simple, adaptable movement-based active learning strategies to instructors of college coursework.

Background

Classroom physical activity is movement within core-content classes that is facilitated by the teacher as a mechanism to enhance student learning. The link between physical activity and cognitive function and brain health was originally explored in animal studies (Neeper, Gómez -Pinilla, Coi, & Cotman, 1996; Radák et al., 2001). This association was next supported in older adults, linking physical activity with protection against neurodegeneration (Laurin, Verreault, Lindsay, MacPherson, & Rockwood, 2001; Rabin et al., 2019), increases in brain volume, and improvements in executive control and memory (Colcombe et al., 2006; Kramer et al., 1999; Erickson et al., 2011). Since about 2000, research specifically targeting school-based physical activity has demonstrated both the feasibility of incorporating movement into the classroom (Delk, Springer, Kelder, & Grayless, 2014; Maeda & Murata, 2004; Stewart, Dennison, Kohl, & Doyle, 2004) and the effectiveness of classroom physical activity on behavior and time-on-task (Goh, Hannon, Webster, Podlog, & Newton, 2016; Grieco, Jowers, & Bartholomew, 2009; Herman, Beer, & Morton, 2013; Mahar et al., 2006), concentration and fluid intelligence (Caterino & Polak, 1999; Reed et al., 2010), cognition (Graham, Bremer, & Cairney, 2017), and academic achievement (Donnelly et al., 2009; Donnelly et al., 2017). Furthermore, integrating physical activity into academic lessons can enhance student interest and motivation (Vazou, Gavrilou, Mamalaki, Papanastasiou, & Sioumala, 2012). Limited school-based evidence currently exists with college-level students, but the correlation between physical activity and cognitive function is retained in this population (Hillman, Snook, & Jerome, 2003). In addition, most college students possess positive affect toward movement in the classroom, citing increased focus, attention, interaction, and enjoyment as results of physical activity opportunities (Ferrer & Laughlin, 2017).

When considering the merits of classroom physical activity for students of any age, it is also relevant to review literature on active learning. In the traditional sense, active learning does not require a movement component, but is designed to dynamically engage students in the learning process. The concept of learning as something to be experienced by students has been traced back to Jean-Jacques Rousseau in the 1700s

(Lindsay, 2016; Sălăvăstru, 2012), and popularized in America by John and Evelyn Dewey in 1915 (Dewey & Dewey, 1915). In the 1980s, active learning pedagogy was promoted in higher education (Bonwell & Eison, 1991) with an American Association for Higher Education bulletin stating, "Learning is not a spectator sport" (Chickering & Gamson, 1987). More recently, research supports that active learning in the college classroom improves short-term recall and long-term retention (Prince, 2013), increases student activity and involvement (Pundak & Rozner, 2008), supports critical thinking and collaboration (Rocca, 2010), and fosters academic achievement (Pirker, Riffnaller-Schiefer, & Gütl, 2014). Given that classroom physical activity is inherently active learning, incorporating movement-based activities into the classroom has the potential to enhance students' learning experience and improve academic performance.

American institutions of higher learning are tasked with embracing innovative pedagogy to advance learning outcomes and increase graduation rates, yet there is a disconnect between research and practice (U.S. Department of Education, 2006). While robust evidence supports the benefit of physically active learning, college instructors may be hesitant to integrate movement in their classrooms due to lack of knowledge, classroom layout and environment, timing considerations, or student involvement concerns. Research suggests, however, that implementing activity on a trial basis can decrease teachers' perceived barriers to adoption and that these challenges can ultimately be diminished or overcome through the trial (Howie et al., 2014). Indeed, there are many activities that are fairly simple to implement in the college classroom that can be modified to different classroom formats, teaching concepts, and student needs. With a "tool kit" of movement-based activity learning strategies that can be adapted to fit content and context, college-level faculty can ameliorate current teaching practices.

Applicable Strategies for Engaging Students in Movement

Though we use a variety of activities in our classrooms, the following movement-based activities work well across the diverse content we teach, ranging from education to kinesiology to health. We have also mentored colleagues in business and in anthropology who have implemented these strategies. Along with our colleagues, we have had the opportunity to conduct these activities across assorted content areas and classroom context. Some activities may work best in more open environments, but they can be modified to fit in confined spaces. From large lecture halls to small conference rooms, with class enrollment from 9 to over a hundred, in class durations from 50 to 90 minutes in a once to thrice weekly timeframe, we have implemented classroom physical activity. Further, activities can be adapted for students of varying cognitive and physical abilities, all to the benefit of our students and their learning experience. As with any effective learning environment, classroom management is critical, and clear guidelines and expectations must be set prior to implementation. Communicating the purpose of movement incorporation and setting the tone for the semester on the first day of class can cultivate student buy-in and promote a classroom climate conducive to movement and engagement. Below, we offer several specific strategies that we have developed or adapted in our own classes for incorporating movement into the college-level classroom that can serve as an introductory "tool kit" of ideas for faculty to engage students across disciplines and learning environments.

Activity: Two Jack Sharing

Think of Two Jack Sharing as a way to facilitate dialogue between students. Each student will find a partner, share the required information, be an active listener, and then complete two jumping jacks (or modified jacks with raised arms and a step out instead of a jump) with their partner. Once the jacks are completed, students will locate a new partner – indicated by other students' jumping jack arm movement – and repeat the sharing, responding, and jacking.

Two Jack Sharing can be used in practically any context and can be used for students to share ideas or tangible assignments. The information exchanged can be a review of, or opinion about, a teacher-provided reading. It could also be something students bring into class, such as a homework assignment, or discussion about a talking prompt. This can serve as a five to ten minute activity or as a longer, more in-depth activity pending the time spent with each partner and the quantity of pairings. Should the classroom space not be conducive to large movement, students can stand and share information with peers near them, doing mini-jacks or another smaller movement between partners.

Unlike traditional question and answer in a lecture, this activity engages all students in the classroom while getting their blood flowing and increasing cognitive functioning to prepare to learn. As with any teaching strategy, it is important to conclude with a recap of new learning. After students have had a chance to share with three to five students, bring the class back together to debrief the information and clarify as necessary.

Example from an Education Class

In an educational psychology class, an introductory class designed for about 30 teacher education majors, students learn about various theories of motivation. To

provide students with a background and to get them thinking about this new topic, students participate in Two Jack Sharing in the first portion of the class period. A question is posted on the screen in the front of the room that asks students, "Think about something you are motivated to do (e.g., working out, cooking, making good grades). Then, share with your partner whether you are motivated because of intrinsic reasons, extrinsic reasons, or both." Students read the question, find a partner, and take turns sharing their responses. After both students have shared, they complete two jumping jacks. Then, they look around to find others who have finished – easily identified because of the arm movement – and share with them. Once students have found two or three partners, they take their seats. Then, we debrief different reasons for motivation, as discussed in the activity, before transitioning to the lecture over the topic.

Example from a Kinesiology Class

In a fundamentals of elementary physical education class, an upper-level course of approximately 20 students in physical education teacher education, the students participate in field experience hours at the local elementary schools. After several observations of an elementary physical education class, they have witnessed various classroom management techniques that align to those discussed in class. Since the students have likely observed different groups of students and/or teachers, Two Jack Sharing is used as a discussion tool to promote best practice in classroom management. Once they find a partner, the student designated "A" shares a classroom management strategy they observed in the elementary classroom, then partner "B" has to evaluate if this is an appropriate classroom management strategy. The partners then switch roles so that partner "B" gives the example and "A" gives the feedback. Once they are both done sharing, they do two jumping jacks and find a new partner. The students change partners at least three times before returning to their seats, which usually takes about 12 minutes.

Activity: Carousel

Similar to the carousel with moving horses, students will rotate around the room in this activity and respond to various prompts posted on the walls. If your budget allows, large self-adhesive pages work well. The primary benefit of the Carousel activity, in addition to the physical movement, is the opportunity for students to discuss content, share perspectives, and collaboratively respond.

Prior to class, prepare the number of prompts needed based on room size and number of students. (The hallway can also be utilized.) If the class is large, a duplicate set of questions can be made, and students can rotate within a sub-group. Ideally, groups will be comprised of three to five students, so students can actively participate in discussion. First, provide directions for the activity. Student groups will go to one of the pages, read the question, write their response, and then rotate to the next page. At each new stop, teams will read the prompt and review prior responses before making changes as they deem necessary and adding new information. Each rotation will last a pre-determined duration; we have used between one and two minutes, depending on the prompt content and quantity. Continue the activity until groups are back to their original page. Then give teams time to review all information on their page and come up with a single "summary statement" to share with the class. The duration of this activity depends upon the number of prompts in the rotation and the time spent at each page. With a minimum of about 15 minutes, this activity can also last up to 60 minutes with a debrief in the end to solicit responses and feedback from students.

We have used this activity to enable students to think critically and relate class readings to course content (i.e., "Considering the article you have read, how does the author's explanation of human development relate to the theories presented in your textbook?") and to address various course content such as, in the context of kinesiology, categorizing physical activities by the health-related fitness concept, writing and aligning objectives for the various domains in physical education, and discussing the characteristics of the varying theories of motor development. It also provides a great course review, with individual topics from throughout the semester on each page (see Appendix).

Example from a Health Class

As a semester review in an environmental health class, the carousel activity has been used in classrooms with as few as 25 students where the desks can be moved away from the walls and in lecture halls with as many as 90 students where desks are bolted to the floor. The course has 14 topics, so 14 pages are posted around the walls of the room. In the lecture hall without an appropriate back wall, the hallway was used as part of the rotating circle. Group size is dependent upon course enrollment that semester, and, in smaller classes, topics were combined on a page. Three to four students per group are ideal, but two or five has also worked successfully.

Once students have found a page, they have 60 seconds to write as much as they can remember about their topic. The collaboration among group members often generates additional ideas, as one will think of a concept, and another will remember the detail. At the minute mark, all groups rotate clockwise to the next page and work on that topic with the new time starting immediately. By the

time students rotate to later pages, more discussion addresses how to expand or modify the thoughts and ideas of previous groups. Once each group returns to their original page, they review all notes and compile a single "take away" statement about their topic to share aloud with the class. One of the most rewarding aspects of using Carousel as an end-of-semester review is the confirmation of new knowledge and the excitement exhibited by students when they conceptualize how much they learned in the course (see Appendix).

Activity: Moving Response

Taking brief assessments before, during, or after delivering content can be helpful. With movement as an assessment tool, professors can do a quick evaluation with minimal advance preparation. This activity is typically short in duration, and all movements can be modified for the amount of space available. When using Moving Response, first decide on the type of assessment questions (e.g., continuum, true/false, or multiple choice). Then, assign different stretches to each answer (e.g., Strongly agree = stretch arms overhead, Agree = rotating torso twist, Disagree = toe touch/forward fold, Strongly disagree = squat sit). Read different statements or questions aloud and have students stretch into the position to indicate their response. As an example, we like to find out how prepared students feel they are for an exam. We may ask them to respond to Likert statements, such as "I thoroughly understand the content we have covered this week," to quickly assess students' beliefs and make adjustments as needed before giving a formal assessment.

Example from a Statistics Class

Because statistics can be a difficult subject for many students, it is important to regularly assess students affectively to determine how they feel about the content. There are numerous examples provided to students for each concept covered, but some students understand more quickly than others. Toward the end of each unit or chapter, a quick movement assessment can help determine whether students are ready to move on or whether we need to cover the information a little more thoroughly. A slide on the front wall indicates a movement for each Likert scale response (i.e., Absolutely disagree: Touch toes, Somewhat disagree: Squat position, Somewhat agree: Stand with arms outstretched in a 'T', Absolutely agree: Stand with arms overhead arching up), which reinforces the concept of Likert scale from course content. A demonstration of each position ensures students understand the response option. Then statements are read aloud, such as, "I have a clear understanding of the different types of reliability." Students will respond with their movements, allowing a visual assessment of understanding, for each statement.

Activity: Stand Up Yes

Stand Up Yes can also be used as a form of assessment or to collect data, and it is applicable for true/false questions or yes/no statements. The instructor reads each statement aloud or displays them on the screen one at a time, and students either stand up to indicate a response of yes/true or remain seated to indicate a response of no/false. This activity is typically short in duration and works well in small spaces since students only need to sit down or stand up. We have used this activity to assess students' understanding of assigned reading material at the beginning of the class, to explore students' attitudes and beliefs, and to determine demographic-type information. This makes a nice first-day-of-class activity with questions like "Could you explain [insert the main topic of the course]?," or, "I am from [insert the state where you teach]," or, "I am a freshman/sophomore/junior/senior."

Stand Up Yes can alternately be used to gather information where many students may be initially a yes with a continuum toward no. For this activity, all students will start standing and will then sit once they get to a question/prompt/number where yes/true is no longer the appropriate response. As an example, if you asked students to write as many examples of healthy produce they can think of in two minutes, everyone would start standing, and your narrowing questions would be, "I got 5," then "I got 10," and "I got 15," until only one student is standing.

Prior to using either Moving Response or Stand Up Yes, consider the information that will be shared and ensure students will feel safe and comfortable electing to sit, stand, stretch, squat, etc., knowing that others will be privy to their response.

Example from an Assessment Class

In a test and measurement course for kinesiology majors, different types of rubrics are discussed, and students learn how to evaluate the quality of a rubric. After the initial lecture over rubrics, students have to bring in examples of rubrics they find searching the Internet, and we do a Stand Up Yes activity using the rubrics. They are asked various questions about their rubrics, such as, "Do you have a checklist?", "Do you have an analytic rating scale?", "Is there discrimination between the performance levels?", and "Are the criteria aligned to the intent of the rubric?". Various students are invited to share more about why they stood up or sat down to further the discussion. This activity lasts approximately 30 minutes and helps the students to apply theory to practice.

Implications and Conclusion

Collectively, we have 35 years of college-level teaching experience and have observed the benefit of movement integration on learning outcomes and classroom climate. Recently we have conducted pilot studies with our students to capture both student impressions of classroom physical activity and the impact of classroom movement on cognitive functioning. Overall, students appreciate the opportunity to engage in movement. One undergraduate student in our classes reported, "I found the in-class activities and discussions the most interesting way to explore new ideas pertaining to the content," while another stated, "I enjoyed how we were able to include moments of brief physical activity to stimulate our brains." Positive impacts are further supported by data demonstrating an increase in cognitive functioning. An initial test determined baseline functioning, and a posttest was given following a bout of classroom physical activity. Results indicate that cognition scores were significantly higher ($t(67) = 6.25$, $p<.001$) following physical activity. These preliminary findings add to the existing literature that justifies classroom physical activity in the college classroom, but further research is needed as adoption of the pedagogy expands.

Classroom physical activity is becoming an accepted practice in primary education but has the potential to benefit learning for all ages and should be utilized in all learning environments. Importantly, engaging students in physically active strategies needs to be presented as a cohesive part of the lesson with expected participation. Students may be initially hesitant, but in our experience, students will come to enjoy the movement with its holistic benefits. When college instructors integrate movement-based active learning into the classroom, students are more likely to exhibit enthusiasm and interest (Ferrer & Laughlin, 2017; Vazou et al., 2012), have greater concept retention (Prince, 2013), and be cognitively prepared to learn (Hillman et al., 2003). By incorporating physically active activities into the college classroom, your students can become more engaged, motivated, and academically successful.

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Appendix

Image of completed post-it from carousel activity as end-of-semester course review