Dynamic Learning: Effects of Movement Upon Focus

Eli Rogers¹, Anna Zhang¹, Michael Clark¹, and Maria Cecilia Barone²

Abstract
The purpose of this study was to determine the effect of creative physical activity upon the alertness level of freshman biology students in workshop. The students were required to participate in course-related group movement and the impacts were evaluated quantitatively by solving a word scramble puzzle, as well as qualitatively. The study found statistical significance in one of three workshops examined and qualitative results showed increased levels of focus and interest. This study has implications in teaching methods and on the ability of TAs to foster increased academic achievement and student interest.

Methods
A total of three independent workshops were studied, comprising 26 total students. Two weeks out of three, students were required to complete a physical activity based on the coursework; each acted as a control in the remaining week. At the end of each workshop students took a ten-question content-relavent word scramble in three minutes and were qualitatively evalauated.

Figure 1: Diagrams (left to right) of hemoglobin, HIV, and a neuron; these were the content bases of the creative physical activities.

Introduction
The essence of a successful teaching environment includes – almost without exception – students interested in and focused upon learning. The traditionally-defined “good teacher” is often one that engages the students through a variety of activities that encourages deep understanding. Even from preschool age, kinesthetic activities have positive impacts on cognition and academic achievement. Recent initiatives for creating experiential learning centers and programs have become highly valued and acclaimed; specifically, collaborative learning approaches have been shown to be successful in developing beneficial learning outcomes. In addition to the favorable impacts upon learning, teaching with creative movement and activity has been shown to encourage student expression, joyful exploration of the subject, and promote scaffolding of learning. In this study, we attempted to build upon the wealth of previous research by determining whether the impacts of creative physical activity and movement are applicable to university-age students in an introductory biology course.

Figure 2: Averaged experimental and control scores for each workshop. Workshop 2 showed statistical significance (p=0.008, denoted by *), indicating that their scores improved with creative physical activity.

Results
In one of the three groups that were studied it was found that there was a statistically greater number of correctly unscrambled words in the experimental weeks on average as compared to the control week (p=.008). The first and third groups’ data showed no statistical significance (p=.21 and p=.08, respectively). The average score was 4.8 questions correct in the experimental weeks, and 4.0 in the control week.

Discussion
The statistical significance of the first workshop suggests an increased level of alertness as caused by the physical activity. Qualitative findings showed greater overall focus and interest during the word scrambles and in the workshop in general. The physical reinforcement of concepts also solidified ideas for students, who reported that recalling information afterward was easier, as well as that the material more enjoyable and relatable. The lack of significance in two workshops may be justified by the confounding variables, including different interest levels in material, difficulty in the word scrambles, workshop dynamic, and the presence of exams. These data, however, suggest overall that the level of alertness manifested by the students generally increased when taught in a kinesthetic, activity-based style. This heightened engagement may lead to more effective learning, increased academic performance, and could nurture passion in the field of biology.

Conclusion
Even though only one group showed statistical significance quantitatively, the qualitative results show a relationship between physical movement and reinforcement of concepts in all three groups of students. Physical activity helped improve the focus, enjoyment, and excitement toward each new idea that was presented and has the potential to show long term results and improvement in learning among students.

1 University of Rochester, Department of Biology, Rochester, NY
2 University of Rochester, Center for Excellence in Teaching and Learning; Rochester, NY