

Abstract:

Student centered teaching was previously found to enhance student understanding and even improve performance of students in other courses taken in the same semester in high school (6). In an effort to improve student performance in related science classes, the same student centered methods used in my Physiology and Disease (PAD) class were implemented in a Biophysics class this semester. Initial student surveys showed that students felt that integrating physiology concepts into Biophysics helped them understand the material from two very different perspectives, giving them a "more complete picture". Test scores from each of the four units were compared in an effort to correlate this integration to test performance. The preliminary results marginally suggest that integrating student centered physiology learning into Biophysics can extend a positive influence upon test performance.

Introduction:

- Inquiry based learning has been credited in recent years with helping students understand and retain material better, as well as improving their performance on tests in high schools (2, 4) as well as in college (1, 3) to increase student learning.
- Biophysics is a one semester Physics elective for juniors and seniors at IMSA, and the pilot class in F2011 was run by integrating physiology principles into Physics units in an effort to encourage student centered learning.
- The objective of this study was to encourage students to take responsibility for their own learning in the first semester of a Biophysics class

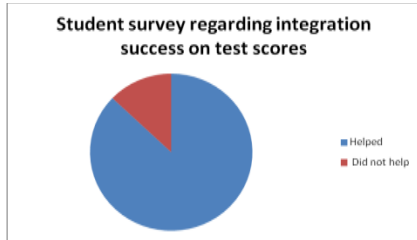


Figure 3: Results of a student survey regarding the success of physiology and physics integration on test scores

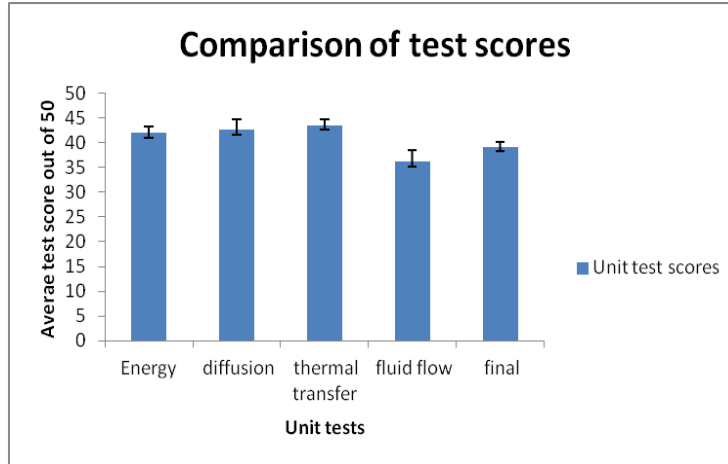


Figure 1: Average unit test scores were compared for the first semester of Biophysics. Test scores were measured out of 50. The highest average test score was for the thermal transfer test (43.56) and the lowest for the fluid flow test (36.17).

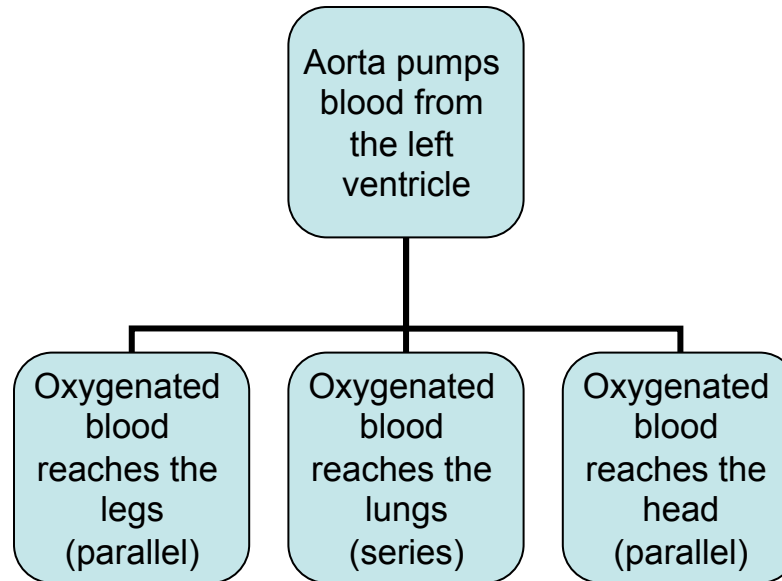


Figure 2: Chart diagram of series and parallel using blood flow from the aorta as a model

Materials and methods:

- 31 students in two sections of Biophysics in F2011 were given instruction in integrating physics and biology using student centered techniques previously tried in PAD. Student test scores were surveyed to find out whether their study habits in Biophysics positively impacted their performance on the tests.
- Physiology principles were used in each of the 4 units to teach Biophysics.
- Students were also surveyed as to how this integration helped them study for tests.
- All data were analyzed using one way ANOVA for independent samples using Vassar statistics. (<http://faculty.vassar.edu/lowry/VassarStats.html>) (5). In addition, graphs were made using Microsoft Excel.

Results and Discussion:

- Comparison of test scores showed that there was a significant difference ($P < 0.05$) between scores for test 4 and 5, which could be a result of the increased eligibility of the thermal transfer material to being taught through principles of physiology compared to fluid flow. Also, due to a time crunch, the fluid flow unit was shortened and this might have been reflected in the test scores as well.
- Students enjoyed learning about a new discipline and how it connected with Physics.
- 87.1% of the students felt that the integration of physiology and physics helped them study for their tests (Fig. 3). The remaining 12.9% disagreed.
- Further research is planned with more students in Biophysics classes to quantitatively reinforce these preliminary results.

References:

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