

Problem-based Learning to Increase Concept Attainment in Anatomy and Physiology

An Action Research Proposal

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High school teachers face a dilemma to deliver content that is engaging and motivating. Many science classes tend to be content heavy and still rely on traditional lecture-based instruction to teach new concepts. Problem-based learning (PBL) is a relatively new pedagogy method first started at the medical school at McMaster University in Canada in the 1970s. It is a constructivist, learner-centered method that strives to engage students in real-world problems (Boss, 2011). Many educators see PBL as a modern spin of the Socratic method. Although there are several studies showing that PBL can increase concept attainment in undergraduate science classes (Carrió et al. 2011 and Tatar et al. 2011), there are currently no published studies in high school science classes.

The purpose of this action research study is to evaluate the effectiveness of problem-based learning (PBL) to increase concept attainment in high school anatomy and physiology students at a private high school on O‘ahu. The expected outcome for this study is that PBL will help students gain an understanding of the human cardiovascular system while working collaboratively in a team to solve a given medical case.

The learners in this action research study will be high school students ranging from grades 10 - 12 at Punahou School, an independent K-12 school on O‘ahu. All students have laptops connected to the school’s wireless network. They are digital natives with prior experience navigating through the school’s Moodle course management system.

The methodology involves students working collaboratively in a problem-based learning project while learning the basics of the cardiovascular system. Students will use

a variety of web 2.0 tools throughout the project to help plan, design, and develop their ideas and understanding. The web 2.0 tools will include Popplet.com, Google Docs, and VoiceThread. In addition, students will also be using Microsoft Excel to create tables and graphs for their project. This action research project will take three, one-and-a-half hour classes to implement in the classroom.

Artifacts such as students' Popplets, VoiceThread presentation, and quizzes will be gathered to evaluate the effectiveness of the PBL project in meeting its goals. Other data will include classroom observations, student interviews, and teacher interviews. Additionally, students will complete a pre-module survey and a post-module survey so comparison can be made regarding concept attainment before and after the PBL module. Classroom artifacts will be rated manually before analysis. The students' responses on surveys and quiz results will be analyzed using Microsoft Excel. This data analysis portion will take one month.

Problem-based learning has been shown to have positive outcomes to increase students motivation, engagement, and concept attainment. As many science teachers are still struggling to deliver content effectively, this action research study will determine whether PBL is an effective method in helping high school students with concept attainment.

References

- Boss, S. (September 20, 2011.). Project-Based Learning: A Short History. *Edutopia*. Retrieved March 16, 2012, from <http://www.edutopia.org/project-based-learning-history>
- Carrió, M., Larramona, P., Baños, J. E., & Pérez, J. (2011). The effectiveness of the hybrid problem-based learning approach in the teaching of biology: a comparison with lecture-based learning. *Journal of Biological Education (Society of Biology)*, 45(4), 229–235. doi:10.1080/00219266.2010.546011
- Tatar, E., & Oktay, M. (2011). The effectiveness of problem-based learning on teaching the first law of thermodynamics. *Research in Science & Technological Education*, 29(3), 315–332. doi:10.1080/02635143.2011.599318