

Development of Game-Like Learning Objects (GLOs) to Enhance a Learner-Centered Approach to Blended Learning

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We wish to provide materials for use before classes that are cost-free, engaging, and designed to stimulate student interest and motivation to learn biological content. Thus, we are developing online modules in the form of game-like learning objects (GLOs). Each GLO covers basic concepts in a selected topic of biology. Learning objectives of the GLO are presented as quests, with each quest taking the student to a scientific article, narrated slide-show, video clip, or interactive simulation, followed by assessment questions with immediate feedback. A GLO developed for the topic “Introduction to Cells” is described in this article.

Keywords: online materials, game-like, cells

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Introduction

As we have begun to move toward a blended classroom format in Introductory Biology, lack of preparation by students before class has made it difficult to implement active learning during class, especially in sections that meet in large lecture halls. Biology textbooks and online publisher’s materials are not working well for learning outside of class, and these materials are becoming a financial burden for our students. Thus we wish to provide online materials for use before classes that are cost-free, engaging, and more likely to stimulate student interest in biological content and motivation to learn. Recent studies have revealed that game-based learning has a positive impact on student motivation. As summarized by Johnson et al. in a recent Horizon Report (2013), research has revealed that educational game-play increases critical thinking and problem solving in learners and can be used to reinforce “real world applications of concepts.” The most recent development in this realm is gamification, the incorporation of game elements and frameworks into non-game scenarios. Thus, a gamified learning object is not an actual game, but includes game-like features that engage and motivate the learner. The gamification trend in education is just beginning, but has gained

support among researchers and educators who recognize its potential to stimulate productivity and creative inquiry in learners (Johnson et al., 2013). Thus we decided to develop game-like learning objects (GLOs) for selected topics in Introductory Biology.

Development of a GLO

Our GLOs are designed to be used on the Internet, before class meetings on the GLO topic. Each GLO will cover the basic concepts of a specific topic, thus allowing instructors to use class time for active learning approaches that delve more deeply into the topic and promote critical thinking and problem solving skills. Each GLO will contain learning objectives presented as quests, with each quest taking the student to a scientific article, narrated slide-show, video clip, or interactive simulation, followed by assessment questions with immediate feedback. The GLOs are entirely html5/JavaScript format for universal usage and can be edited and customized for a variety of purposes. A GLO developed for the topic “Introduction to Cells” is illustrated in Fig. 1.



Figure 1. This GLO is designed for the topic Introduction to Cells. Students click on Begin Your Quest to receive a brief introduction by the professor guide, Dr. Black, and view the Quest Board. They then begin each quest, as indicated on the board, by accessing each of 7 hot spots represented by icons (mouse is positioned on the portrait hotspot). A new page that pops up from each hotspot will display a digital asset as follows: bookshelf--an introductory article on cells; portrait gallery--a history of the cell theory featuring Hooke, Schleiden and Schwann, and Virchow; graph—an interactive simulation depicting the relationship between cell size and volume; bacteria—a narrated slide show depicting basic cell structure and the types of microscopes used to study cells; microscope—a virtual microscope that allows the student to study a light micrograph of cells by moving the “slide” and changing magnification; clock--video of a narrated trip in a time machine to learn the conditions of early earth and view the formation of the first cell-like structures; beaker--an interactive animation about experiments to create organic molecules and cell-like structures in the laboratory.

Literature Cited

Johnson, L., S. Adams Becker, M. Cummins, V. Estrada, A. Freeman, and H. Ludgate, 2013. NMC Horizon Report: 2013 Higher Education Edition. Austin, Texas: The New Media Consortium. ISBN 978-0-9883762-6-7. Retrieved from <http://www.nmc.org/pdf/2013-horizon-report-HE.pdf>

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Citing This Article

Black, BL. and L. Welsh. 2015. Development of Game-Like Learning Objects (GLOs) to Enhance a Learner-Centered Approach to Blended Learning. Article 55 in *Tested Studies for Laboratory Teaching*, Volume 36 (K. McMahon, Editor). Proceedings of the 36th Conference of the Association for Biology Laboratory Education (ABLE), <http://www.ableweb.org/volumes/vol-36/?art=55>

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