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

Betty L. Black and Laura Welsh

Department of Biological Sciences, North Carolina State University, Raleigh NC 27695-7617 USA (blblack@ncsu.edu; lewelsh@ncsu.edu)

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

Link to Original Poster: http://www.ableweb.org/volumes/vol-36/poster?art55

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 hotpot 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

Mission, Review Process & Disclaimer

The Association for Biology Laboratory Education (ABLE) was founded in 1979 to promote information exchange among university and college educators actively concerned with teaching biology in a laboratory setting. The focus of ABLE is to improve the undergraduate biology laboratory experience by promoting the development and dissemination of interesting, innovative, and reliable laboratory exercises. For more information about ABLE, please visit http://www.ableweb.org/

Papers published in Tested Studies for Laboratory Teaching: Peer-Reviewed Proceedings of the Conference of the Association for Biology Laboratory Education are evaluated and selected by a committee prior to presentation at the conference, peer-reviewed by participants at the conference, and edited by members of the ABLE Editorial Board.

Citing This Article


Compilation © 2015 by the Association for Biology Laboratory Education, ISBN 1-890444-18-9. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the copyright owner.

ABLE strongly encourages individuals to use the exercises in this proceedings volume in their teaching program. If this exercise is used solely at one’s own institution with no intent for profit, it is excluded from the preceding copyright restriction, unless otherwise noted on the copyright notice of the individual chapter in this volume. Proper credit to this publication must be included in your laboratory outline for each use; a sample citation is given above.