

Inspiring Non-Science Students in STEM Courses: The Illustrated Novel Project

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ABSTRACT

General education courses in science can be challenging to teach. The first reason for this is that many students do not relate to the material. The second reason is that students simply fear “doing science”. To overcome both of these obstacles and help students fully engage in STEM related disciplines, we have designed an “Illustrated Novel” project. This project requires each student to create a 15-20 page illustrated novel focusing on a topic within human biology. Initial results show that students find the project beneficial, both in helping to increase their personal interest in biology and as an effective studying tool.

Keywords: STEM, student retention, teaching quality

INTRODUCTION & BACKGROUND

Teaching general education courses in science to non-science majors can be challenging. These students come from varied backgrounds and many of them are unmotivated, feel they cannot relate to the subject matter or perceive scientific concepts to be too difficult to understand. These obstacles often discourage students from fully engaging in science and from exploring degrees in scientific disciplines. They are thus precluded from pursuing future careers in science, technology, engineering and math (STEM) related fields. Many students self-confess that they are either “not good at science” or that they are “scared of science.” To defuse the anxiety typically associated with scientific term papers and also to demystify the notion that science is only for an academic elite, we have designed the “Illustrated Novel” project. This form of active learning encourages the student to engage in the subject using creative approaches to analogize, compare, contrast and showcase a biological concept. Active learning techniques have been shown to engage the student in the subject matter more effectively than traditional lecture format (Freeman et al., 2007; Prince, 2004). This teaching tool was designed to promote student interest in STEM-related disciplines.

METHODOLOGY

Students created a 15-20 page illustrated novel highlighting an area of interest within human biology. They were then graded on scientific accuracy, scientific depth, creativity and effort. To determine how beneficial the project is to student learning, we implemented a pre- and post-project survey of the 120 students taking this course in 2011. The pre-survey assessed students’ feelings towards, and previous experiences with science courses. Additionally, comments were solicited as to the students’ hopes and expectations for this project. The post-project survey addressed whether the illustrated novel project has indeed enhanced their knowledge of the subject material and stimulated their interest in and enjoyment of science. Likert scales were employed to allow students flexibility in their responses. The data was analyzed using quantitative and qualitative methods

FINDINGS

Anecdotal accounts from students have indicated that the project has helped them gain confidence in the course, and prepare for exams. In many cases, students have shared their novels with friends and family outside of class. Furthermore, several students have used these projects in their employment or portfolios, or plan to do so following graduation. At the beginning of the course the students expressed interest in both science and biology however, over 50% of the class reported finding science to be difficult (Table 1). At the end of the course, student interest in biology had increased to 64%. They also reported that the illustrated novel had helped them to study biology.

Table 1: Pre and post course surveys (IN = Illustrated Novel) Pre-Survey n=110, Post-Survey n=80

Pre-Survey Results		Post Survey Results	
Science is interesting	56%	IN made biology interesting	60%
Science is difficult	51%	IN help with studying biology	55%
Biology is interesting	51%	IN made me appreciative of biology	64%

SUMMARY

The illustrated novel both increased interest in biology and helped with scientific learning, thus diminishing the difficulty associated with science that was previously reported by students. Post survey comments include positive responses to the project and emphasize that the project allowed the students to learn their topic in detail.

SUGGESTIONS FOR BEST PRACTICES & CONCLUSIONS

This project allows students to use several different learning styles, encouraging inclusivity. Second, the students generate creative science-related and in some cases, personal novels. Third, students enhance their understanding of science while simultaneously drawing on their personal strengths and discipline-based training (sketching ability, writing skills, interest in education, or business skills). It is important to note that while the majority of the students found science in itself interesting, approximately the same number also found it to be difficult to comprehend. This is actually very positive news for science. Since the interest in science is already present, it seems to be imperative that we create new and innovative ways to maintain, if not increase the interest such that the learning of science does not become an obstacle to success. The illustrated novel hopes to do just that.

FUTURE WORK

We have initiated a collaboration with a local high school, where science teachers utilize select novels in their classes. The activity encourages students to proofread and critique the novels. We are designing a biology novel website, where college and high school students can access novels from prior classes. Novels will be categorized by topic. Ideally, the first novels uploaded will be used to encourage present students to create new ‘chapters’ and expand on topic material.

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