INTRODUCTION

‘Attention spans have shortened,’ is a common phrase often used in reference to today’s college students. As faculty and instructors, we need to address this issue through the utilization of innovative and creative techniques that aid in making our subjects accessible to our students. Connecting a serious topic such as microbiology with a ‘fun’ activity can increase student engagement and learning. Ideas to maintain student attention on a subject include providing information in 15- to 20-minute blocks, giving one- to two-minute assignments, and providing an active learning activity at least once per hour. But what if we could also increase their engagement with science by connecting it to things they already think of outside of class, and, in addition, make science thinking interdisciplinary? I have recently introduced exercises that connect music and art to various microbiology topics in my class.

The creative processes in art and science have much in common. Albert Einstein recognized that both science and art delve into the mysterious by stating, “The most beautiful thing we can experience is the mysterious. It is the source of all true art and all science” (1). Connecting these subjects in the minds of our students will help them realize the importance of technology, industry, and progress in science and simultaneously emphasize the importance of art, music, and the humanities. The tools presented here will encourage students to connect new science information through the music and art they already know and, therefore, provide increased engagement and retention of the new knowledge.

These techniques used in a microbiology class increased the amount of time spent thinking about new information, increased engagement with the information being presented, and encouraged critical thinking of microbiology topics. These tools were used in an upper level microbiology course. The first tool uses music to (1) provide aural clues connected to specific pathogens; (2) encourage the student to interpret the song and identify ideas of the song with characteristics of the pathogen; and (3) allow the student to explore their own musical interests and connect that back to the topic pathogen. The second tool uses art to allow the student to (1) realize the intersection of art with science and (2) encourage critical thinking skills to conceptualize microbiology concepts from a unique perspective.

PROCEDURE

Music and science

For the first tool—“Bug Songs”—an obsession with music or recruitment of like-minded colleagues and friends is necessary. Develop a list of lecture topics with key words for each lecture, and then identify a song that relates to these key words. Ideally, the key words are lecture-specific and provide the student with a direct connection between each song and the lecture. The song should not be a direct giveaway to the topic. As tempting as it was to use “Love is a Case of Anthrax” by Gang of Four for a lecture on Bacillus anthracis, that would be a dead giveaway. Using “Toxic” by Britney Spears encourages the student to think of the words of the song to make the connection to toxins as the primary virulence factor of B. anthracis.

This exercise works best as part of the student class participation grade. All submissions are made via email. The student is provided two options to earn credit. Students can simply explain why this song relates to the lecture, or they can reply with another song that relates to the lecture, and provide the name of the artist, the song, and the reason it works. This second option not only engages the student longer, it also allows the instructor to build a library of songs that can be used in future course offerings. Students were provided a rubric for class participation grading (see Appendix 1). Six different activities counted towards class participation, of which music was one. To receive an ‘A,’ students were expected to contribute regularly and dependably to three or more of the six options each week. Each music submission counted as one credit towards class participation.

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†Supplemental materials available at http://jmbe.asm.org

Tips & Tools

Connecting Music, Art, and Science for Increased Creativity and Topic Engagement

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McNEALY: MUSIC AND ART IN SCIENCE CLASS

Visual arts and science

The visual arts can also be used to improve students’ analytical and critical thinking skills. The visual arts include painting, sculpture, photography, and drawing. Because science and art share a base in creativity, this tool can be used to expand student use of their creative thinking processes. The goal of using visual arts in this class was to encourage students to go beyond their comfort zone by identifying a piece of art that spoke to them and describe it in terms of art and the relationship to microbiology. Students were given the assignment to find a piece of professional art, discuss the artist and the piece, and then write about how the piece, for them, connects to microbiology. For the first use of this assignment, it was graded as an extra credit assignment in order to gauge student interest, participation, and suitability. Students could submit two pieces, one at mid-term and one at the final.

CONCLUSION

Over the course of the semester, 174 submissions from a class of 24 students were received from 21 song opportunities. Seventeen students elected to complete the art and science assignment with 14 of them turning in two assignments. Positive comments from the students were received on both types of assignments with many of them emphasizing the originality of the assignments. The students seemed to enjoy the music at the start of the class and, more importantly, it made them pay attention to the lecture as they had an assignment from the start—‘what is the relationship of this song to the rest of the lecture?’ This tool encouraged critical thinking skills as well as basic classroom skills.

Connections made by students in the art analysis included the obvious—glass sculptures of bacteria; The Plague by Arnold Bocklin; and The Sick Child by Edvard Munch. However, other unique connections, such as Monet’s Water Lilies and biofilms and Blue Poles by Jackson Pollock representing the world outnumbered by microorganisms, were also submitted. The connections between art and science are only limited by the student’s imagination. This assignment was enjoyable for both the students to complete and for the instructor to grade.

Creativity is about being able to look at things from different perspectives—a necessary skill in science and art and therefore a necessary tool in the instruction of science. Not only does the use of creativity in the classroom create diverse learning experiences, it also engages the student from a new and different perspective. It helps the students make a new connection to the information being received, involves the student to a greater extent with the topic content, and leads to better long-term retention.

SUPPLEMENTAL MATERIALS

Appendix 1: Grading rubric for class participation

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