Using Anthropomorphism and Fictional Story Development to Enhance Student Learning †

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INTRODUCTION

Understanding mechanisms of human disease can be challenging enough for students with a basic background in anatomy and biology, and it can be nearly impossible for students without any prior exposure to these basic sciences. A critical review of pedagogical approaches used in teaching elementary undergraduate science led us to the design of our novel approach for understanding human disease for learners from various science backgrounds. Anthropomorphism in elementary science education has been debated historically (1). Some educators feel young children accept anthropomorphic and teleological formulations as fact, while others believe these formulations lead to educated discussions regarding mechanistic science (2, 3). It is generally accepted that students in higher education are capable of distinguishing differences between anthropomorphic formulations and mechanistic facts, enabling utilization of formulations to gain a broader perspective on course content (4). Research shows undergraduate chemistry students prefer teleological explanations over causal explanations on selected topics regardless of their scientific background (5).

Here, we combined traditional lecture using causal and mechanistic explanations with story creation by anthropomorphizing disease processes. This novel approach moves beyond simply assigning human-like qualities to non-human subjects by intentionally using anthropomorphic and teleological principles in the creation of fictional characters and stories. This tool was tested in the undergraduate human disease course Disease and Lifestyle (15 to 25 students), a requirement for all health promotion majors. It is a general education elective for all non-health majors. Sophomore standing is required due to the level of maturity needed for participation in discussions on disease and death.

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

PROCEDURE

The instructor delivered a brief lecture interpreting a reading assignment completed by students prior to attending class or tutoring. Next, the instructor, together with the students, generated a story incorporating scientific concepts while transforming agents of disease or wellness into characters. Story development can be done in multiple ways. One approach is to direct character building while asking the class to provide details to a growing story that the instructor begins. Another is to separate students into small groups asking them to build a story and characters using leading prompts (Appendix 1). A third approach is to review course material individually, guiding a student in the creative design of characters. Students personalize content using their imagination to build unique and memorable characters. It is important that in each approach the instructor or the students draw the scene on a whiteboard or paper as the story is building. The instructor gleaned inspiration for characters and stories from patient case studies, children’s books, and brainstorming with an undergraduate assistant.

Here, we provide one example using the tool to explain the inflammatory process. A main character named Bob was developed. Bob is landscaping for his wife who has pestered him to complete it all week. While trimming the tree, he disturbs a beehive, causing a swarm of bees to surround him. Since Bob is afraid of bees, he starts running and trips over a rock, cutting his knee. When analyzing the actions inside the knee that aid in the process of inflammation, anthropomorphism of the components begins. The rock is a vehicle carrying enemy pyromaniacs (bacteria) that cuts open the knee and unloads the enemies into the wound. Following entry of the enemies, vasodilators and chemotactic factors, including histamines, or “fire-heroes” are released. These heroes quickly act to increase vascular permeability, white blood cell movement, and protein trafficking to the area, like water putting out a fire. White-suited janitors, Phil, Mark, and Denny, known as phagocytes, rush to the scene to clean up the debris, a process called phagocytosis. The story continues on to describe the entire process of inflammation. This topic took two class periods (2 h 30 min) to complete. This story can be extrapolated to discuss wound healing, hypersensitivity (bee sting), or what happens when Bob has...
a heart attack due to constant stress. Extrapolated stories are limited to 20 minutes each of class time. At the end of each lesson, students associate traits, names, or aesthetics with components of the disease process, making them able to recall the information with ease and apply learned information when analyzing patient examples to determine diagnoses on exam questions. This approach has been applied to several learning modules throughout the semester. It is not suggested that it be used as the sole teaching method, in order to preserve novelty and effectiveness.

Safety issues

None

CONCLUSION

Two sections of the course were taught within the same semester, one using the tool and one not. Formative assessment of critical thinking exercises and summative assessments of exam questions showed increased learning and performance by students in the course section that utilized the tool over students in the control section. Students within the experimental section demonstrated increased competence in mapping and explaining pathological pathways on exam questions following lessons delivered using fictional characters, compared with students who had lessons delivered via traditional lecture alone. Additionally, student feedback on this approach was very positive. Students reported feeling more alert, attentive, and engaged, and they experienced increased enjoyment in the learning process.

The type of scaffolding described in the procedure helps students move towards the highest level (create) of the Revised Bloom’s Taxonomy of Learning (6). This movement was demonstrated by students’ ability to use knowledge learned to create original fictional stories. This scaffolded design takes advantage of the benefits of passive learning via traditional lecture, then stimulates active learning by asking students to use learned content to create stories. Rooted in metacognition, this heuristic approach addresses visual, auditory, and kinesthetic student learning modalities by charging students with synthesizing learned information to create characters and draw out unfolding scenes while evaluating their thinking, ensuring accuracy in the science. Conceptualizing content as fictional stories by anthropomorphizing disease components is a metacognitive approach that appeals to all learning modalities and can be applied to any human disease or science course.

SUPPLEMENTAL MATERIALS

Appendix I: Examples of leading prompts

ACKNOWLEDGMENTS

The authors thank Ithaca College Librarian Laura Kuo for assistance with a comprehensive literature search. The authors declare no conflicts of interest. The corresponding author presented this approach at ASMCUE 2016.

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