CUREcasts: An Innovative Mechanism to Increase Communication of Scientific Outcomes to Novice and Expert Audiences within the Context of Course-Based Undergraduate Research Experiences †

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INTRODUCTION

The recent emergence of course-based undergraduate research experiences (CUREs) has resulted in a marked increase in opportunities for students at all levels to engage in authentic scientific practices. Current evidence within the bioeducation literature indicates that student participation in CUREs positively impacts their development of scientific process skills, affect, and reasoning abilities in the domain (1–3). Furthermore, CUREs have been documented to enhance student interest in and persistence toward pursuing research-oriented scientific careers (1, 4, 5). Despite the importance of these findings, few studies have examined the mechanisms for dissemination of research outcomes associated with student-driven inquiry. This latter concept of broader relevance is a hallmark of CUREs (6) and offers an avenue for exploring science communication practices in CURE contexts more acutely. In this article, we describe an exercise in which upper-division students enrolled in a field-based Arctic/Polar science CURE created CUREcasts—an adaptation of video podcast media (7)—that detailed both the nature of the independent research they were conducting and relevant methods and tools for engaging in such research endeavors. Utilizing the EdPuzzle platform (https://edpuzzle.com) (described at greater length in the Procedures section), students worked collaboratively with the course instructors to infuse closed- and open-ended questions into all CUREcasts, resulting in deliverables that can be used in lower-division CUREs as well as distributed to faculty and scientific professionals for pedagogical and content-specific purposes.

PROCEDURES

Preparing to create CUREcasts

Prior to project implementation, instructors should purchase at least one video camera and one tripod for filming purposes. CUREcasts referenced in this article were captured using a GOPRO HERO5 Black Edition action camera (https://shop.gopro.com/cameras/hero5-black/CHDHX-501-master.html) with a standard SONY ELECTRONICS tripod. CAMTASIA (version 3; TECHSMITH) was subsequently purchased and used to edit all video; however, alternatives such as iMovie would likewise be suitable. Finally, instructor/student teams should register for an EdPuzzle teacher account (https://edpuzzle.com). EdPuzzle is an online platform that allows questions to be directly incorporated into a video source and the resulting videos to be assigned to students enrolled in the course (or sent via a hyperlink). For this reason, this latter step is only relevant if the instructor/student teams seek to use the CUREcasts as instructional tools in the classroom or as deliverables to the public/scientific community. In the context described, a master teacher account was created such that both the instructors and the student cohort developing the CUREcasts could access EdPuzzle, and the course instructor worked with students to facilitate creation of closed- and open-ended questions at both the lower- and higher-order cognitive levels (8, 9).

Creating and editing CUREcasts

Students should first be arranged in pairs, as the combined expertise within the team (e.g., video-editing) increases the likelihood of high-quality production of CUREcasts. Student teams should then select two themes to discuss within their videos—one that focuses on content of topical relevance to the course and a second that seeks to describe a research method or tool relevant for conducting inquiry in that field. Sample themes for an Arctic/Polar science field course, the disciplinary context for this article, can be found in Appendix I. The instructor should encourage students to make use of props and other materials

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Using CUREcasts to create teaching tools

Once each CUREcast has been produced in full, and with the assistance of the course instructor, student teams should upload their completed file to the EdPuzzle site. Specific instructions for incorporating questions into the videocasts can be found on the EdPuzzle website. While outside of the scope of the present article, these educational deliverables can then be used as instructional tools in parallel course contexts (e.g., an introductory Arctic/Polar science CURE).

CONCLUSIONS

In an effort to evaluate the impact of participation in the CUREcast initiative on students’ development of Arctic/Polar science content knowledge, enjoyment, and science communication skills, we administered a 10-item Student Perceptions of Learning Gains (SPLG) assessment in post-intervention format (Appendix 4) \((n = 3;\) representing 75% of the sample population). Furthermore, an in-house CUREcast Video Rubric (CVR) was developed to evaluate student products on two dimensions: (a) adherence to criteria detailing the process for generating CUREcasts; and (b) overall quality of the finished product (Appendix 5). The SPLG data indicated 100% agreement (i.e., a response of “agree” or “strongly agree”) on all items with the exception of the fourth statement, “The CUREcast initiative increased my skills in video production, editing, and dissemination,” which 67% of participants agreed with and one ranked as “neutral.” In addition, CVR results indicated that students had effectively addressed all dimensions required of the task (data not shown). While beyond the scope of the present article, pre-/post-intervention approaches will be used to assess subsequent incorporation of CUREcast products into the introductory biology curriculum at our university. We are also in the process of developing a university-hosted website to distribute CUREcasts to the scientific community on a wider scale.

Importantly, though CUREcasts were created for an upper-division Field Biology CURE in this context, the cost- and resource-effective nature of the initiative makes it amenable to both STEM and non-STEM coursework at all levels. Indeed, we argue that large-scale generation of such videocasts would serve to advance science communication and literacy in ways that extend well beyond the classroom to highlight the broader relevance of science to the world in which we live.

SUPPLEMENTAL MATERIALS

Appendix 1: Sample CUREcast topics
Appendix 2: CUREcast instructions
Appendix 3: CUREcast feedback form (student version)
Appendix 4: Student perceptions of learning gains (SPLG) survey
Appendix 5: CUREcast video rubric (CVR)

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