

Original Paper

Not all Doom and Gloom: Students in the Anthropocene Develop Collaborative Skills Using Social Media and Surveys

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Abstract

Informing undergraduates on environmental conservation education topics related to the Anthropocene can present challenges. Allowing students to work together in groups to actively design projects to both conduct surveys and inform others via social media are two related strategies for student based instruction as a form of learning. As part of a special topic conservation biology course, Humans in the Anthropocene, undergraduate biology majors collected data from surveys on topics related to the Anthropocene, while concomitantly using social media (posting 2 TikTok videos) to engage in science communication and learn about factors impacting topics. Responses to Likert scale questions and reflections from this group activity were overwhelmingly positive with students reporting they preferred this form of hands-on learning and that this activity piqued their interest, and students learned valuable skills on data presentation alongside creative communication using social media. Incorporating surveys, videos, and presentations therefore is an effective method for engaging students and communities regarding environmental issues related to the Anthropocene.

Keywords

science education, group projects, science communication, biology pedagogy, Anthropocene

1. Introduction

Integration of group projects and inclusion of collaborative methods into teaching science can concomitantly inform and provide an avenue for students to develop critical scientific and life skills. Moreover, cooperative learning in the classroom can enable students to learn to a greater extent than individual learning (Johnson & Johnson, 1989). Indeed, with individuals learning together to create a product in a collaborative learning environment is an educational approach that allows for multiple perspectives to be incorporated when facing challenges (Laal et al., 2012). Collaborative learning can

result in increasing critical and creative thinking when incorporated into biology learning (Hakim et al., 2020; Ramdani et al., 2022). This form of learning in science education can take the form of either debates on issues in biology (Anderson 1998), use of technology and microscopes to measure and identify structures (Gould, et al., 2019), or by having students formulate problems of interest and investigate in groups using video or interviews (Chin & Chia, 2010). Utilizing a “journal club” approach whereby students read primary articles published in scientific journals and discuss alongside PowerPoint media further encourages the development of overcoming challenges and developing scientific literacy in an undergraduate biology course (DeBuran, 2002).

One approach for potentially transformative experiences in teaching biology involve issues with the environment or problems facing the ability and future of humans on earth. The Anthropocene is defined as the time frame whereby Earth is a human-dominated new geological epoch, either beginning in 1600’s or in 1960’s (Lewis & Maslin 2015). Indeed, education should incorporate Anthropocene aspects in the classroom that incorporate economic and political perspectives such as climate change curricula in higher education (Leichenko & O’Brien, 2020). This educational approach to incorporate the geological and ecological Anthropocene includes subject matters such as art (Bertling & Moore, 2020), business or technology (Brennan, 2017) and even health profession education (Barna et al., 2020). Subsequently, the environmental challenges of the Anthropocene may be especially important in future course pedagogy for STEM (Science, Technology, Engineering, and Math) education which allow students to engage with the community (Mychajliw et al., 2015). Therefore, techniques to teach undergraduate majors the importance of the Anthropocene are needed to further investigate effective teaching strategies.

Hands-on pedagogical approaches such as conducting student research can promote success and encourage active participation into the learning process as students carry out experiments and collect biological data (Knutson et al., 2010). Therefore, it is important to incorporate methods that pique student interest in science learning and inquiry while actively involving students in developing research as it relates to the perception students possess of the Anthropocene. This approach has the potential to increase overall knowledge of important environmental issues in the Anthropocene facing students across disciplines. Surveys are a standard method of obtaining data from potentially large samples in a short amount of time with Google form surveys a free online survey platform (Mondal et al., 2018). While surveys can provide a viable methodology for collecting data, additional approaches to better understand how science informs the general public via social media technology can further engage students.

Education methods should increasingly investigate emerging technologies, i.e., social media videos, as new learning models to promote alternative pedagogies when compared to traditional lectures for dissemination of information and science communication. Social media has been recently utilized as a learning tool to motivate student success in science (Akgunduz & Akinoglu, 2017), with TikTok being one application for educators and student learning (Adnan et al., 2021; Nichita et al., 2021). TikTok

users are typically younger (Suarez-Alvarez & Garcia-Jimenez, 2021), and thus provides an ideal platform for undergraduate university students to communicate science regarding the Anthropocene. TikTok videos on environmental issues include a range of short videos on climate change, use of fossil fuels, and pollution (Hautea et al., 2021). Moreover, designing conservation projects utilizing social media allows students to collaborate on creative communication skills alongside fostering self-regulated learning (Shrader & Louw, 2023).

The purpose of this study was to investigate whether students working in groups developing a) Google Surveys to collect data and b) TikTok videos to inform the general public were engaged by this form of collaborative learning in science as part of a conservation biology course on the Anthropocene (entitled “Humans in the Anthropocene”). This research was guided by whether students found these collaborative group projects as an informative, creative pedagogical method to further develop science communication and analytical inquiry skills. This manuscript is novel in that it provides a format for inclusion of multiple methods to increase engagement and student learning at the university level in science as it relates to teaching about conservation biology and the Anthropocene.

2. Method

2.1 Student Participants and Course Design of Collaborative Learning Projects

This study was carried out as part of a special topics course taught at Wingate University, offered by the Biology department, for undergraduate biology majors. Participants included 24 students enrolled in a course entitled “Humans in the Anthropocene”. The course was similar to a conservation biology class, but primarily focused on the dissemination of all aspects related to wildlife, humans, the environment, and perspectives related to the Anthropocene. This course involved creating a semester long learning environment whereby students learned via short lecture, scientific journal discussion, followed by group projects selected by students. Students were instructed to form groups, identify a subject of interest related to the course, and conduct their own research on the environmental problem and perspective to inform their methods for survey and developing science media to communicate the issue. Specifically, students were tasked to collaborate within their groups to develop a Google Form Survey to collect data on university knowledge and attitudes towards their specific issue.

On average for each group project students developed 8-10 questions. Students also developed 2 TikTok videos (Table 1; Figure 1), each one utilizing a different approach (i.e., short versus longer slide show video, one with or without hashtags, or one incorporating sounds and graphics and another without, etc.). Surveys were conducted on campus and each survey consisted incorporating a free QR code generated by QR Code Generator (www.qr-code-generator.com). This allowed for students to share their survey with fellow students across other classrooms, or in person by setting up tables on campus during peak activity (time between classes, etc.) using only a QR code link to their survey and having participants take surveys on their individual mobile phones. Surveys were checked by instructor (author) periodically for potential problem solving issues and feedback. Both surveys and videos were

deployed during the last third of the course to ensure student groups had ample time to collect data, troubleshoot video editing, adequate time for videos being posted, and to analyze and summarize their data from both surveys and videos. Students collected daily information on their posted TikTok videos for 2 weeks, recording daily and total number of views and number of likes. The final day of the course consisted of groups presenting their data to the class via PowerPoint presentation. The research presented here emphasizes the pedagogy of collaborative student group developed surveys and videos, and not specific data generated by students from their group projects.

Table 1. Student Group TikTok Video Metrics and Topics

Topic	Video 1	Video 2
6 th Mass Extinction	Interview Elements: sound effects Time: 1:31	Informational Elements: Dramatic Style with clips Time: 1:22
Bees & Their Importance	Informative, Elements: Cute dog, voice modified, graphics Time 1:54	Informative: Elements: Popup text and Graphics Time: 18 s
Biophilia	Slideshow Elements: Comparative pictures, sound Time: 22 s	Slideshow Elements: Image collage Time: 10 s
Microplastics	Animated Elements: Animation, Group rap song, modified voice filter Time: 28 s	Slideshow Element: Voice modified Time: 19s
Invasive Species	Slideshow Elements: Meme Time: 8 s	Slideshow Elements: Voice over, cute animal Time: 25s
Shark Conservation	Slideshow Elements: Sad song Time: 16 s	Informational Elements: Happy song Time: 15 s
The Doomsday Clock	Cinematic Elements: original film content Time: 1:06	Informational slideshow Elements: Dramatic Style w clips Time: 1:03

2.1.1 Post-Activity Survey

A short survey was given to all student participants immediately following the group presentations. This survey consisted of four questions, *Q1*: “Was the group project an engaging way to learn about collecting data/reaching the community on an environmental issue?”, *Q2*: “On a scale of 1 to 6, did the group project help you learn about an important environmental issue related to humans in the Anthropocene”, *Q3*: “On a scale of 1 to 6, was the group project a creative and informative way to learn about how scientists collaborate and communicate with the general public about environmental issues?”, and *Q4*: “Additional comments on the group project, presentations?”.

2.3 Data Analysis

Qualitative and quantitative data were obtained for the efficacy of this collaborative learning method. Descriptive statistics are reported for metrics obtained by student groups for their survey and posted video project. A Spearman’s Rho Correlation test was performed between total number of views and number of likes for TikTok videos.



Figure 1. Example of Video Elements Utilized by Students in Their Posted TikToks, Including Slideshow Format for Invasive Species, Slideshow Format for Shark Conservation, and Pop up Text and Graphics for Saving the Bees Student Group Projects

3. Results and Discussion

Student successfully worked in collaborative groups, generated survey data indicate a variety of responses and across majors to issues related to the Anthropocene and in posting TikTok videos. Based on the assessment survey of students enrolled in the course, students overwhelmingly found this activity (group project) engaging based on feedback and student responses to the post-activity survey (Table 2). Responses to *Q1*, *Q2*, *Q3*, were high, indicating students assessing their knowledge and learning felt collaborative projects were engaging and was a positive experiential method of learning Anthropocene issues, collecting and presenting data. Comments and responses to *Q4*, indicate students perceived this course as an effective way to conduct their own research on Anthropocene topics in

groups. Despite a small sample size, student feedback included a range of responses when conducting their surveys, but were successful in completion of their specific projects.

Overall, there was a range of video viewing and number of likes, with total videos having a mean of 363.2 views and 44.7 likes, on average during the two weeks of the final class project data collection period. However, the majority of videos, surprisingly did not receive more views, and appeared to have a limited number of viewings. A significant correlation was found between the number of video views and number of likes, $r^s = 0.644$, $p = 0.013$, $N = 14$.

Social media can provide a powerful tool for engaging and teaching in the classroom (Moody, 2010) and can provide a method for discussion (Chawinga, 2017). Moreover, communicating science across disciplines and media may greatly aid study of the Anthropocene (Bergillos, 2021), with TikTok one outlet for students to communicate research projects in science in the online environment (Radin & Light, 2022). Therefore, future incorporation of social media platforms in the classroom could be aided by further collaboration across disciplines, possibly non-biology or non-science majors, such as art or media students, as well as other majors. This could ensure multiple perspectives are included in social media postings.

Students found that generating their own dataset after designing a Google survey was an effective method to disseminate information to both majors and non-majors on university campus (Figure 2). Based on student feedback during the course, Google forms are user friendly, and with the automatic method in which they chart results, can enable students to see results from survey data in real time. All students downloaded their data for further analysis, indicating that this technique should be used by students, which mention they were motivated and took ownership of survey data. Overall students further collaborated on final presentations (Figure 3), enabling them to develop presentation skills in front of their peers. Indeed, learning to communicate across science and liberal arts has been identified as an important component of impacting diverse groups of Anthropocene stakeholders (Bostic & Howey, 2017).

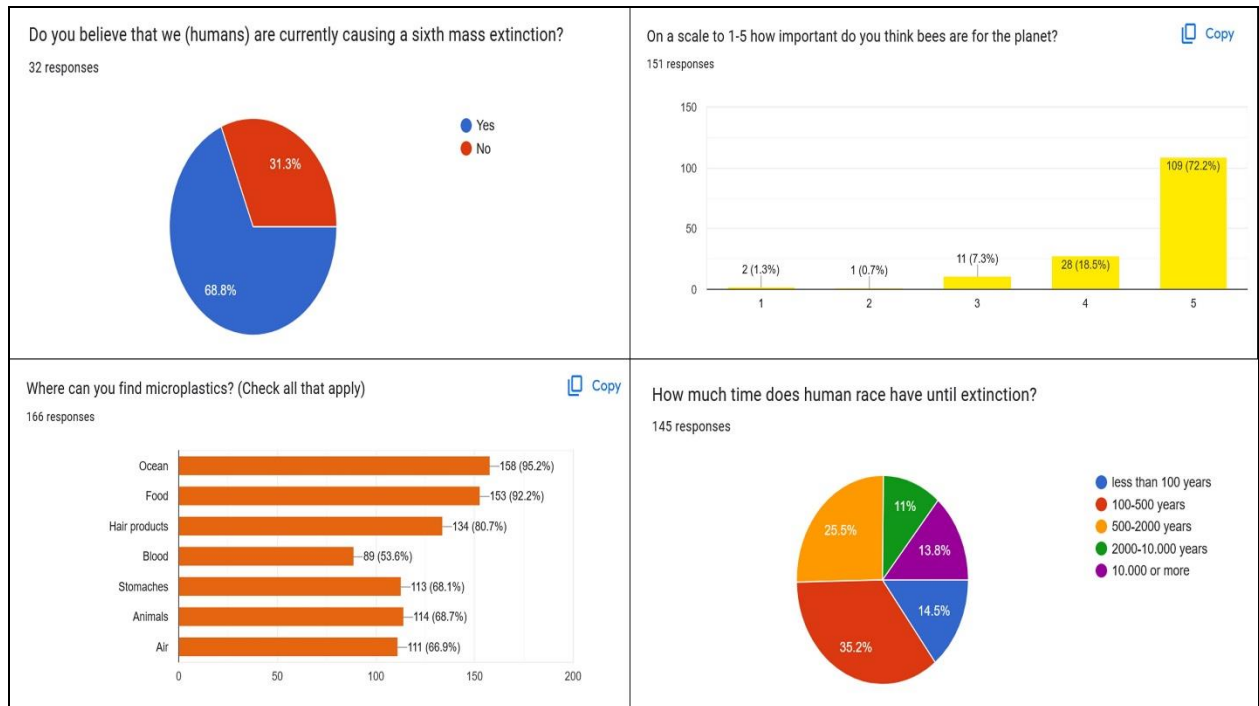


Figure 2. Example Survey Questions Obtained by Groups, Including Surveys on 6th Mass Extinction, Saving the Bees, Microplastics, and Doomsday Clock

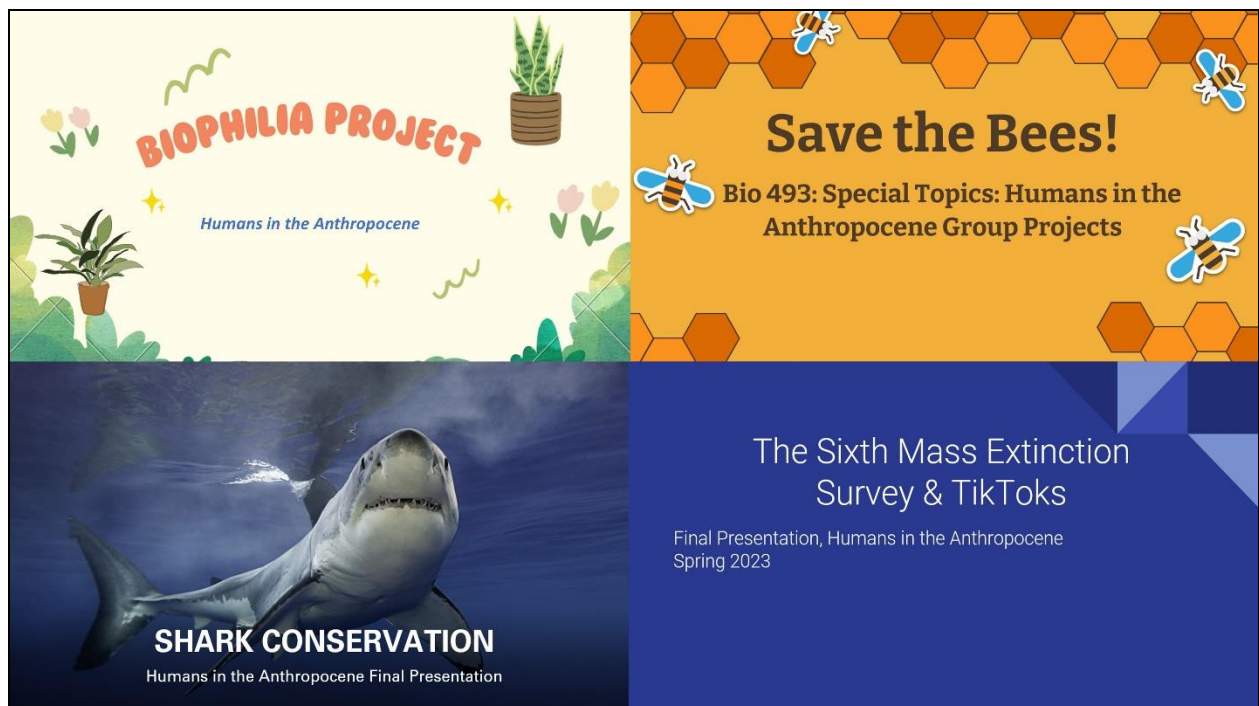


Figure 3. Example of Group Project Final Presentation Title Slides Showing Projects on Biophilia, Saving the Bees, Shark Conservation, and the 6th Mass Extinction Topics

Table 2. Mean and Median Responses to Follow-up Survey Post Activity Questions Q1, Q2, Q3, and Example Responses for Q4

Survey Question	Student Responses
Q1: “Was the group project an engaging way to learn about collecting data/reaching the community on an environmental issue?”	100% Yes
Q2: “On a scale of 1 to 6, did the group project help you learn about an important environmental issue related to humans in the Anthropocene?”	Mean = 5.8 Median = 6
Q3: “On a scale of 1 to 6, was the group project a creative and informative way to learn about how scientists collaborate and communicate with the general public about environmental issues?”	Mean = 5.7 Median = 6
Q4: “Additional comments on the group project, presentations?”	<p><i>“Making the TikToks was fun and I enjoyed this group project which allowed me to collaborate with fellow students and learn about science.”</i></p> <p><i>“This was a great way to learn about different Anthropocene topics and spread the word, and an awesome project and engaging activity.”</i></p> <p><i>“I liked both the survey project and also the videos which were very fun and creative to make, as before this project I didn’t know you could use google survey to generate data.”</i></p> <p><i>“I liked the group project and in the future you could also use YouTube videos to get the scientific message across to non-majors and make an impact.”</i></p> <p><i>“I enjoyed engaging with fellow university students on the survey and educating them about Anthropocene topics, and enjoyed filming the TikTok videos, and learned that most people are willing to learn about science.”</i></p> <p><i>“I felt like this project helped me to understand and interpret data we obtained. Working in groups was really helpful and interesting since every group</i></p>

member contributed different opinions and thoughts on both the Google survey, TikTok videos, and final presentation.”

4. Conclusion and Recommendations

This study found that incorporating student designed surveys, videos, and presentations fostered learning in a creative, collaborative classroom environment, with students engaged in the information, and in communicating science as it relates to the Anthropocene. It would be therefore beneficial to further examine how incorporating Anthropocene topics into different disciplines would increase knowledge of the Anthropocene across a university campus. Surprisingly, TikTok videos received lower than expected views, which appeared to reach a carrying capacity within ~2-3 days after posting for most group videos, regardless of type of media incorporated within video. Since no videos went “viral” we recommend the formation of repeated, perhaps weekly videos posted on TikTok and other social media outlets (Twitter, Facebook, etc.) as well as You Tube, to increase science communication skills of students or other entities interested in reaching the general public on environmental issues related to the Anthropocene. Moreover, Google Forms provide a free, highly customizable method when combined with easily obtained QR codes enabling quick collection of data by undergraduate students. Concomitantly utilizing social media alongside community outreach events could further draw attention to how Anthropocene topics can relate to economic sustainability, renewable energy, and an assortment of scientific future research. This pedagogical approach can be incorporated into multidisciplinary undergraduate courses across different majors, thereby increasing the level of student collaboration between science and non-science majors.

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