The Art of Science Communication—A Novel Approach to Science Communication Training

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Effective communication is a requisite skill for scientists. However, formalized training in this area is often unavailable for members of the scientific community. As one approach to combat this problem, the American Society for Biochemistry and Molecular Biology (ASBMB) developed The Art of Science Communication, an eight-week-long online course that provides facilitated instruction on how to communicate science in an oral format. The course is offered three times a year, and as of December 2017, nearly 200 individuals from all career stages have taken part in it. The course completion rate is currently 60%, a rate three to five times as high as the average for similar Massive Open Online Courses (MOOCs). Participants have indicated that taking the course has improved their ability to communicate about their research, and that the skills and lessons learned have benefited them professionally. Moving forward, we are examining approaches that will help us improve the course and expand its reach throughout the scientific community. This article details the development of the course and examines the role and potential of such training within the larger scientific community.

INTRODUCTION

With science playing an increasingly prominent role in everyday life, it is imperative for scientists to communicate effectively both with each other and with the lay public. Unfortunately, formal training in this area is sorely lacking. To address this need, the American Society for Biochemistry and Molecular Biology (ASBMB) developed The Art of Science Communication (ASC), an online course that provides in-depth, fundamental training on effective oral science communication. In this article, we describe the course, the impact it has had so far, and how members of the scientific community can use these resources to enhance existing training programs in their own institutions.

PROCEDURE

We based The Art of Science Communication on communication training classes and workshops several of us have run in our careers (1–4). Our decision to run the course online was inspired by the exciting potential of Massive Open Online Courses (MOOCs) to reach a global audience. Participation in the course is available to anyone (and therefore “open”); however, we require a small registration fee to incentivize participation by registrants. The course is hosted on a Moodle-based platform that is integrated within the ASBMB web infrastructure, allowing for easy editing, replication, and dissemination of content by ASBMB staff.

The course is eight weeks long, with six weeks of online content and two weeks of final presentations (for syllabus, see Appendix 1). The most vital component of the course is a weekly online interactive workshop using a virtual platform such as Skype or Google Plus. Participants are supervised by a set of virtual discussion leaders, each of whom is skilled in science communication. These live sessions provide outlets for participants to interact and allow instructors to offer direct feedback on assignments and discussion topics. We deliberately limit the number of participants in each session.
to provide a more meaningful learning experience that avoids some of the size-related pitfalls that plague MOOCs (5).

In the first week of instruction, participants are introduced to science communication and to the course setup. At this time, participants record themselves giving a brief presentation on a scientific topic of their choosing, usually focusing on their own research. The videos are shared through the e-learning platform, where they are reviewed and critiqued by peers and instructors. These presentations serve as a reference point for student improvement throughout the course. In future sessions of the course, we will include examples of pre- and post-course videos and a viewing guide. These resources will help participants analyze the peer presentations and use the content from the course in their own presentations.

Each of the next five lessons consists of four video lectures that focus on different aspects of science communication, as well as the technical aspects of giving presentations. Along with the main lectures, we provide a list of background resources (such as scholarly articles and external websites) that provide context for that week’s theme. To reinforce each lesson, there are weekly homework assignments that help participants relate the content to their own experiences and viewpoints. Responses are posted in an online forum, where participants discuss the material with their peers and instructors. The final homework assignment asks students to create a “Good Presentation Bingo” card (www.monicametzler.com/bad-presentation-bingo) using the communication skills they learned from the previous weeks of instruction (for sample homework, see Appendix 2).

For the final project, participants revise their initial scientific presentations using techniques learned throughout the course. These videos are shared with the discussion group, and members of the groups reflect on individual improvement and the effectiveness of the revised presentations. Participants are encouraged to use their “Good Presentation Bingo” cards to help with evaluation. Those who finish the course receive a certificate of completion from ASBMB.

With training in science communication becoming increasingly available at universities, we partnered with faculty members to offer “blended” versions of the ASC course (6). Instructors have run free-standing versions of the ASC course and have also integrated our content into existing courses that are part of their university curriculum. In this setting, students independently review the online content before meeting for in-person class discussions facilitated by an instructor who has previously taken the course online.

CONCLUSION

Since its debut in 2015, 188 participants from 16 countries have enrolled in The Art of Science Communication, demonstrating the universal appeal of the course and its ability to reach people far and wide. More impressively, 113 individuals (60%) have completed the full course and final project (Table 1). By comparison, the average completion rate for a standard MOOC ranges from 10% to 15% (5, 7, 8). We believe the personalized oversight from our instructors and explicit delineation of the expectations and course outcomes contribute to this exceptional completion rate.

Course graduates have said that they feel better prepared to present their work to different audiences (Table 2). Several individuals used the training to improve their professional obligations, such as departmental seminars and teaching duties. Others have been motivated to take part in public-facing outreach and engagement events such as science cafes. Furthermore, several individuals returned to serve as instructors for the ASC course, bringing our efforts full circle.

Despite our success, there are several challenges to be overcome. The biggest issue we face is scale. We deliberately limit the number of participants per group to five or six, to ensure personalized guidance from our course instructors. This means that the course is only reaching a fraction of potential participants. In order to expand the online course, we are constantly training more instructors. We are also expanding the number of institutions offering the blended course. We are currently targeting NIH T32 programs, since professional skills development for trainees is a key requirement for this grant. As of December 2017, 90 individuals participated in a blended version of the course, with 76 individuals (84%) completing the full course and final project (Table 3).

Finally, we are identifying strategies to assess the impact of the course on those who have taken it. Though we conduct an informal post-course survey of participants, we need to obtain objective evaluation that measures the actual efficacy of the course. This will demonstrate how participants have changed (and hopefully improved) their approaches and behaviors related to communicating science. To this end, we have established a “course alumni” group to provide a space for alumni to share successes (or failures) in outreach and to recruit further course instructors. Most importantly, this group will allow us to explore the long-term impact of the science communication training on our course participants.

SUPPLEMENTAL MATERIALS

Appendix 1: The Art of Science Communication course syllabus
Appendix 2: Example of student assignment

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TABLE 1.
Career-stage distribution and completion percentages for participants in The Art of Science Communication online course sessions.

<table>
<thead>
<tr>
<th></th>
<th>Undergraduate Students</th>
<th>Graduate Students</th>
<th>Postdocs</th>
<th>Faculty</th>
<th>Other</th>
<th>Total</th>
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<tbody>
<tr>
<td>Started course</td>
<td>7</td>
<td>73</td>
<td>42</td>
<td>48</td>
<td>18</td>
<td>188</td>
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<tr>
<td>Completed final project</td>
<td>4</td>
<td>50</td>
<td>31</td>
<td>22</td>
<td>6</td>
<td>113</td>
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<tr>
<td>Completion percentage</td>
<td>57%</td>
<td>68%</td>
<td>74%</td>
<td>46%</td>
<td>33%</td>
<td>60%</td>
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TABLE 2.
Feedback on The Art of Science Communication.

**Question: How Effective Is This Course In Teaching How To Communicate Science?**

- I definitely feel more confident and prepared for communicating science using non-technical language. Many of the techniques and tips will be useful for my own teaching. In fact it has already started to have a positive impact on my ability to communicate science in speaking and writing.
- I expected to become more at ease in finding the right words to describe my research in an understandable way. Also I wanted to challenge myself in doing an international online course that uses modern communication technologies such as YouTube. I expected to be evaluated honestly and to learn new ways of communicating efficiently what I love about science. All my expectations were met and I feel more at ease when talking to people about my project. I feel more comfortable in general speaking in front of an audience and I’m having fun with it, while still being professional and credible.
- As someone educated with very limited formal instruction in science communication, I know this was something that was long overdue. Even with a vast experience of presenting my research, this class has immediately helped me improve my presentations to a science audience. It was also very effective in helping me develop skill and a talk to give to a lay audience. In addition, I think that this course has helped focus my message when writing grants.
- The Art of Science Communication was a very insightful course. I learned several presentation techniques to diverse audiences without doing away with the scientific aspect of my talks. The best things about the course were the “before” and “after” presentations that made it very easy to observe our progress systematically. Since every class is focused on a specific part of a presentation, it was easy to follow and keep up with the course. I have used my knowledge from the course to teach undergrads and give talks to scientific and lay audiences, and it has worked really well!
- I felt like I had already learned so much about communicating from the videos, but the discussion really took it to another level. We got really fantastic tips from our leader, and the other group members helped me come up with ways to explain an idea that I was stuck on! Their feedback was invaluable!

TABLE 3.
Career-stage distribution and completion percentages for participants in The Art of Science Communication blended course sessions.

<table>
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<th>Postdocs</th>
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<tr>
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<td>30</td>
<td>90</td>
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<tr>
<td>Completed final project</td>
<td>14</td>
<td>45</td>
<td>17</td>
<td>76</td>
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<tr>
<td>Completion percentage</td>
<td>100%</td>
<td>98%</td>
<td>57%</td>
<td>84%</td>
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REFERENCES

6. Dorn C. 2017. There are many ways to skin this course. ASBMB Today 16(8):34–36.