

Improving Scientific Communication through the Use of U.S. Geological Survey Video Podcasts

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Abstract

IT IS CRUCIAL THAT SCIENTISTS FIND INNOVATIVE WAYS OF EFFECTIVELY COMMUNICATING RESEARCH to resource managers, public officials, and the general public. New technologies, such as video podcasts, are being used as an outreach tool to communicate results from the U.S Geological Survey (USGS) National Water-Quality Assessment (NAWQA) program. The purpose of these podcasts is to summarize scientific research and methods from the NAWQA program. Video podcasts are audio podcasts that incorporate video clips to illustrate ideas presented in simple, concise language with brief 3 to 5-minute films. The process of creating concise podcast messages expands the potential audience for communicating research findings, but the production of video podcasts requires adequate allocation of time and resources. Audience responses to NAWQA podcasts thus far indicate that video is an effective means of sharing scientific information with a broader audience.

Introduction

Public communication and engagement are recognized priorities for environmental scientists (Lubchenco 1998; Jordan et al. 2009). The challenge is transmitting scientific information in a manner that is comprehensible and engaging to non-scientific audiences (Groffman et al. 2010). Traditionally, scientists assumed the general public's lack of scientific understanding generally was a result of low scientific literacy. The belief has been that scientific communication can be improved through increasing scientific understanding of concepts and using this information to educate the public (Bauer et al. 2007). As a result, peer-reviewed journal articles and scientific reports are the primary tools scientists use for communicating scientific results. Although these

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products are excellent for communicating scientific research, the audience generally is limited to other scientists (Weingart et al. 2000).

To reach a broader audience, scientists must frame their results in a way that resonates with the general public by considering different methods for communicating scientific results. Challenges in communicating results to the general public include engaging general audiences, connecting scientific results to public values, and using new communication tools that can reach a broad range of audiences (Goffman et al. 2010). In order to accomplish this, scientists must reconsider how they will communicate their results by developing a clear communication strategy that tells the story, connects with the audience, and then provides the audience with practical information about how the associated results can be applied (Olson 2009). Generally, it is not effective to overwhelm an audience with statistics and complex details (Weingart et al. 2000). Communicating complex scientific concepts and processes involves determining the content that will apply to and resonate with an audience and then providing the information through a delivery method that will directly reach this audience (Olson 2009).

Short video podcasts, as used in the NAWQA program, are one such method of delivering a message to a non-scientific audience. Generally, film is not a good medium for providing detailed information; however, they can be effective at creating a single, deep impression (Olson 2009). By delivering one single piece of information, video podcasts can stimulate viewer interest in the scientific topic and results. Video podcasts are short film clips related to a specific theme, and they can be downloaded for viewing and delivered by an automated feed with computer software to subscribers. Once downloaded, video podcasts can be viewed anywhere on a computer, and they appeal to various learning styles (Herkenhoff 2006). If effectively deployed, video podcasts can improve scientific communication to general audiences by making information more accessible to auditory learners and improving engagement levels (Boulos et al. 2006).

Video podcasts are now part of the USGS CoreCast series. CoreCast video and audio podcasts focus on nationally relevant issues, including immediate breaking news about earthquakes and other natural disasters, recently released results of scientific studies, and other USGS topics that are relevant. Between August 2007 and March 2011, more than 20,000 users have accessed the USGS CoreCast series, and 100,000 downloads have been made. Currently, the USGS CoreCast has 3,350 subscribers who automatically receive new CoreCast video podcasts upon release at <http://www.usgs.gov/corecast/>. One NAWQA video in this series (Episode 127) communicates general results from a long-term study that focused on examining the effects of urbanization on stream ecosystems (EUSE). This video podcast can be downloaded at <http://nc.water.usgs.gov/podcasts/>. Recently, the EUSE video podcast has been used as a case study to determine (1) how video podcasts can be used to effectively communicate science, and (2) what the strengths and weaknesses of the EUSE podcast are in communicating science.

Methods

Two methods were used in the research of the effectiveness of the EUSE video podcast. First, an evaluation form was distributed at the 2010 meeting of the American Geophysical Union (AGU) in San Francisco, CA, where the EUSE video podcast was presented. For this evaluation, Likert-scale responses were used to obtain feedback on what the audience considered important elements of the video podcast. Both closed and open-ended questions were included to evaluate the effectiveness of the podcast's substance and style for communicating scientific results. Descriptive statistics and general themes from responses to open-ended questions are presented in order to help synthesize results from the evaluations. Additionally, the EUSE video podcast was featured at the 2011 Aquatic Sciences Film Festival of the American Society of Limnology and Oceanography (ASLO). Here, the video podcast was evaluated by professional filmmakers,

Randy Olson and Dorie Barton, who provided qualitative feedback on the effectiveness of the video podcast in communicating science <http://www.aquaticsci.net/?cat=105>.

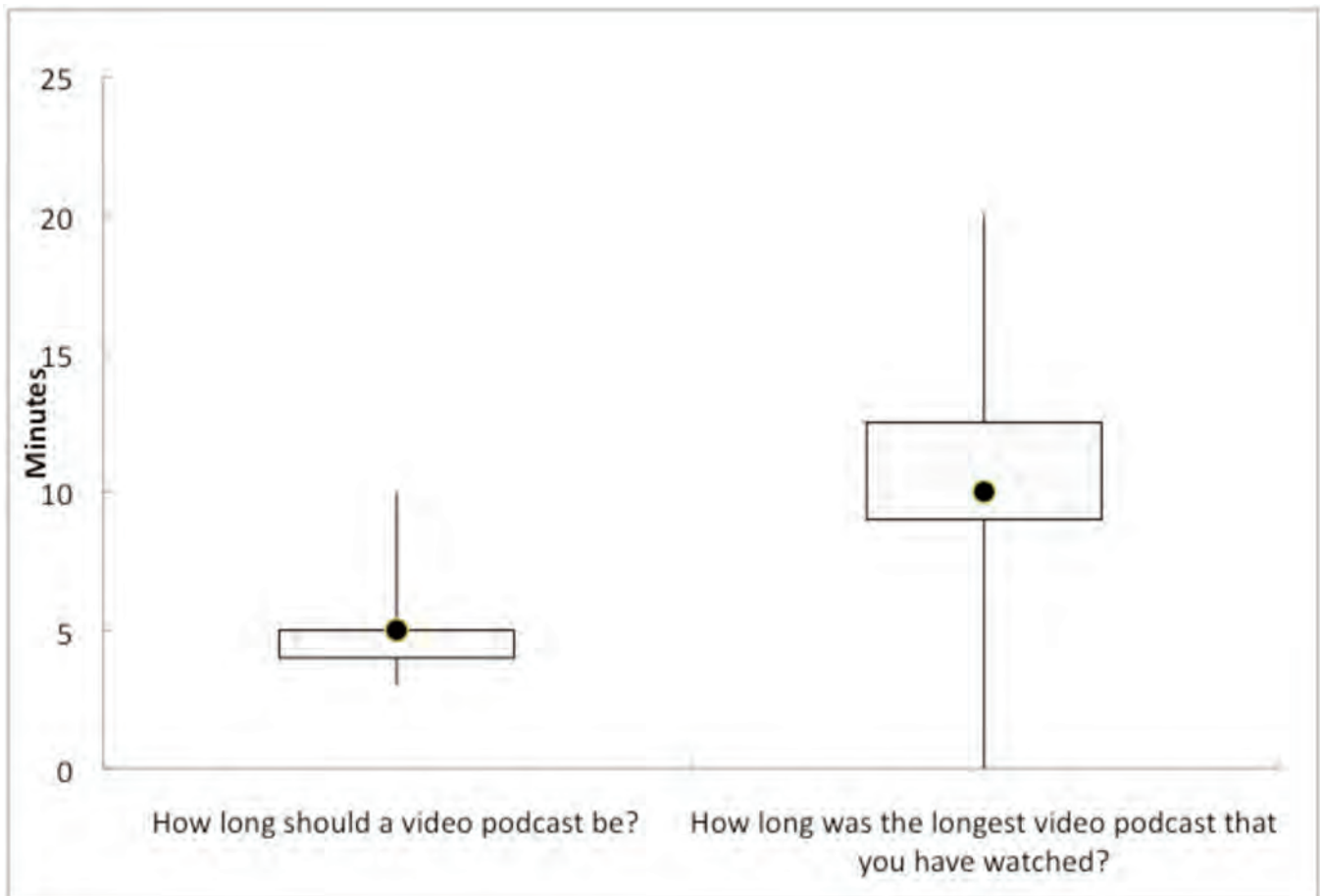
Results

A total of 23 evaluations were received from session participants at the AGU meeting. Respondents' ages ranged from 25 to 66, and the median age was 41. Generally, respondents were highly educated. Every respondent had a college degree, 9 respondents had master's degrees, and 11 respondents had doctoral degrees. All respondents worked in the fields of science (n=12), education (n=9) and(or) communication (n=6).

On average, all respondents agreed that the podcasts should be 5 minutes or less. Responses were open ended and ranged from less than 3 minutes to a maximum of 10 minutes, but only two respondents suggested that podcasts should be more than 5 minutes. Despite this opinion, the majority of respondents had watched podcasts as long as 10-15 minutes in the past (Figure 1). The respondents previously viewed podcasts on YouTube (n=13), news or newspaper websites (n=13), or other science-agency websites (n=12). Fewer people viewed podcasts on Google viewer (n=6) or the USGS website (n=4). National Public Radio, Andrill.org, and Facebook were also listed as other venues for viewing podcasts. Four of the respondents had never before viewed a podcast.

As part of the survey, the audience was asked to rank the importance of various video podcast elements. The boxplots in Figure 2 highlight the median and range of audience responses. A rank of 1 represents elements ranked as least important, and 10 represents elements ranked as

Figure 1. Reviewers' responses to questions regarding the ideal length of video podcast (n=23). Median values are represented by the black circle.



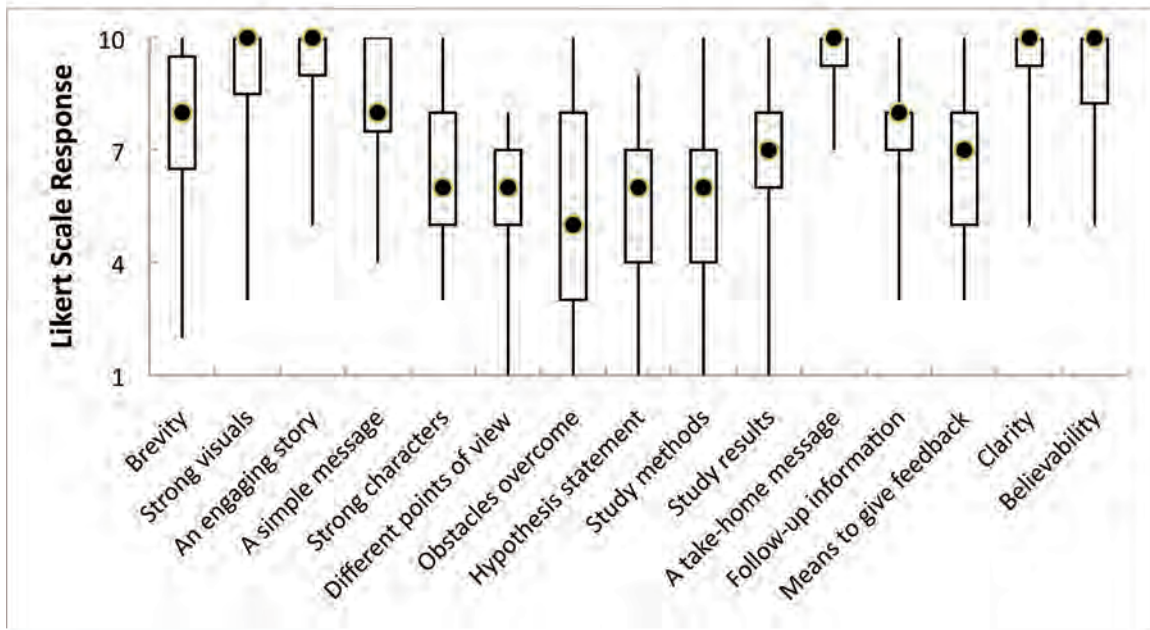


Figure 2. Reviewers ranked the importance of various elements in the EUSE video podcast from 1 to 10 using the Likert scale in which 1 represents elements the reviewers strongly agreed were least important and 10 represents elements the reviewers strongly agreed were most important, with 5 being neutral. Median values are represented by the black circle.

most important (Figure 2). In all, 16 elements were ranked and then divided into two groups that represent the two parts of communication—style and substance. When it comes to style, short, sweet and complete were the preferred methods of communicating by video podcast. Respondents felt it was important to keep the audience engaged by having good visuals, a simple message, and an engaging story told within the brief time span of 5 minutes. With regard to substance, respondents felt the podcast needed to be clear, believable, and based on solid science, but they did not feel that it needed to include all of the details. Hence, the rankings were low for traditional elements, such as a hypothesis statement, study results, and study methods traditionally found in scientific reports. The respondents emphasized the importance of not overwhelming the audience with too much information.

Overall, respondents from the AGU meeting thought the EUSE video podcast was a good tool for communicating science, but they also provided some suggestions for improving the style and substance. One of the predominant themes in the survey responses was to keep the podcasts simple and easy to understand. This included having one straightforward take-home message, and eliminating jargon. Several respondents felt the EUSE video podcast included too much jargon. One respondent suggested that a non-scientist should review each script before filming. Respondents also emphasized that it was important for the scientist in the video to speak slowly and clearly. Finally, the respondents were curious about the marketing strategy, and emphasized the importance of getting video podcasts out to wider audiences. Between June 2010 and March 2011, the EUSE video had been automatically delivered to 3,500 subscribers. This number does not include individual downloads. Our respondents suggested linking the video podcast to various listservs, especially those that target educators.

Feedback from the two professional filmmakers at the ASLO film festival mirrored these responses. One of the filmmakers really liked the piece because it provides a clear take-home mes-

sage: “I think this is a terrific piece. It’s smart, effective, well produced, well-structured, and conveys its concept very simply and directly to the public.” (Dorie Barton, ASLO) The other filmmaker suggested that the piece could have used a more engaging opening: “Let’s begin by considering what this video is meant to be about — the impact of urban development on streams. Why not convey this in the opening images?” (Randy Olson, ASLO) He emphasized the importance of grabbing the audience from the very beginning so they will be interested in learning more about the message.

Finally, we were interested in learning if our viewers did get the take-home message, the ultimate goal of our podcast. The theme the video podcast intended to convey was urbanization does impact stream ecosystems, but the stream response is related to previous land use and regional differences. Generally, all respondents felt that the take-home message was related to the theme, “impacts of urbanization on stream ecosystems.” Responses varied from “water quality was impacted by urbanization” (n=10) to “water quality was negatively impacted by urbanization” (n=3). A few respondents grasped the point that streams and stream responses varied by region (n=2).

Discussion

Based on this feedback, we conclude that podcasts can be an effective medium for scientific communication if they are simple and easy to understand, with one straightforward take-home message. Video podcasts are most effective when they include good visuals and an engaging story. Too many details can overwhelm the audience. To ensure that a video podcast is brief and to the point, we suggest limiting the length of video podcasts to 5 minutes, as suggested by our reviewers. The goal of the video podcast is to engage and intrigue the audience, and leave them wanting to learn more. An engaging video can entice the audience to seek additional information by visiting the project website, or reading scientific reports and journal articles. The scientists must resist the temptation to include every facet of the study in the video podcast. Rather, video podcasts should be considered a scientific communication tool for general audiences, and an entry portal for those interested in obtaining more details about the research. In some cases, the video podcasts may be a viewer’s first introduction to science. If the video podcast is engaging, the viewer may be inspired to learn more about the topic, or use the results of the science to inform decisions.

Once a video podcast has been created, it is important to consider how the product will be marketed. The most engaging video podcast will not effectively communicate science if it is not viewed. This point really came through in our respondents’ evaluations. People wanted to know how we were marketing the podcasts. They wanted to know who our intended audience was and how we were reaching out to them. The CoreCast network is one tool for marketing the video podcast and automatically informs all subscribers of the podcast, but this currently is limited to a network of 3,500 people.

As a result, we are considering other audiences that may be interested in or affected by the results of our science. We can then use various marketing strategies to get the EUSE video podcast to them. Interested colleagues represent a sub-audience whom we target by e-mail. A suggestion made during our presentation at the 2011 George Wright Society meeting in New Orleans was to partner with parks to broaden the communication of our scientific message. As a result, our video podcast is now featured on the National Park Service’s website at www.nps.gov/gate/naturescience/naturalfeaturesandecosystems.htm. We believe that working with the National Park Service to communicate USGS scientific results could be an excellent way to reach a broader audience, by combining the expertise of both organizations. Future marketing will include expanding our audience to other scientists who work in related disciplines, educators who could

use the video podcast as an educational tool, and professionals, such as town councils, planners, and resource managers, who want to learn more about the effects of urbanization on stream ecosystems.

Engaging the public will be increasingly important in the future, as scientists are called upon to demonstrate the public value of scientific research (Lubchenco 1998; Jordan et al. 2009). Scientific research, results from programs such as NAWQA, and specialized studies such as EUSE, can help decision makers more wisely plan urban development and protect water resources. Strategic planning of communication messages, identifying new audiences and communication channels, and creating interesting, informative products, such as video podcasts, will be vital tools for relaying scientific results to the public and decision makers. Video podcasts require time, resources, and qualified staff, but the reviewers' responses indicated that video podcasts can be effective and well worth the investment.

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