Science, Technology and the Nightly News: A Service-Learning-Based Approach in Teaching Science Communication to Journalism Students

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Abstract
Journalists have often been accused of over-simplifying complex scientific stories leading to less audience engagement and information at a time when U.S. news media continue to experience declining audiences. U.S. media has also experienced a gradual decline in coverage of science stories for a variety of reasons. Through a partnership with scientists and the National Science Foundation, journalism students at a university in the Midwest sought to correct this problem using a service-learning approach that produced science-based video content distributed through NSF channels. Results show improved student comprehension of scientific content may increase the quality of science stories available on television news.
Keywords*: science reporting; journalism; service-learning; science communication*

It is not uncommon for a news audience to see stories or headlines about science that seem too good to be true. Headlines such as, "Scientists Say Smelling Farts Might Prevent Cancer," (Stampler, 2014) or "Bananas as good as drugs for treating HIV, say scientists" (Gray, 2010) are not uncommon. Not only are these headlines flashy enough to get the attention of a wide audience, but they also go beyond distributing the facts and wade into the waters of yellow journalism. In fact, much of the news distributed today might be considered such milky fare even by passive audience members.

Kavanagh et al. (2019) found that trust in media has decreased over the last 20 years, especially for television news, which post-2000 has increasingly shifted from "complex detailed reporting of public problems to more conversational, personal exchanges between speakers" (p. 69). This shift to opinion-based journalism has affected the public's trust of media organizations. A recent Gallup poll found that most Americans distrust the media and only 41% have a "great deal" or "fair amount" of trust in newspapers, television and radio to report the news "fully, accurately and fairly." This represents a four-percentage-point dip from the previous year (Brenan, 2019). A Rand study points to four emerging trends among U.S. media consumers: increasing disagreement about objective facts, data, and analysis; a blurring of the line between fact and opinion; an increasing relative volume of opinion over fact; and declining trust in government, media, and other institutions that used to be sources of factual information. These trends have degraded factual discourse and called into question the meaning and purpose of news (Rich, 2018).

This steady decline in trustworthy news media appears in other studies over the last decade. A 2013 Pew Research Center study found that 31% of U.S. adults have left a news outlet that no longer meets their needs. The reason for the exodus? More than 60% say the stories are less complete while another 23.5% claim there are too few news stories provided by these news outlets (Jurkowitz et al., 2013). One might wonder how such claims are made in these times of breaking news and 24-hour news cycles distributed across the web through social media at warp speed.

A closer look at the same Pew study reveals a startling statement about factual news content on cable news channels. Of the big three cable news channels (CNN, Fox News and MSNBC) only one provides more than 50% of factual news content. The others go beyond the halfway mark in providing commentary or opinion. MSNBC was found to provide 85% commentary/opinion content during three days of measurement in late 2012 (Jurkowitz et al., 2013). These statistics may indicate why news audiences are unhappy with the content

available through traditional news channels. Additionally, it becomes increasingly difficult for a lay audience to decipher commentary or opinion from real, fact-based news content.

But the question of mistrust is not limited to media alone. In 2019, The Pew Foundation published 30 pieces of related studies focusing on trust, facts, and democracy and concluded that public trust in institutions such as media and governments has been declining over the years making it difficult to solve critical public problems. About two-thirds of those surveyed believe the federal government and the media withhold important information from them (Rainie & Perrin, 2019).

At a time when legacy media is in decline as a result of technological disruption, sensationalism, and the rise of opinion-based journalism, science journalism has been a major casualty of the financial challenges facing traditional journalism for more than a decade (David, Garty & Tsabari, 2020).

A 2009 study published by the National Science Board found a rapid decline of nightly news coverage on science issues. After reaching a 20-year high in 1999, when nightly news provided more than 750 annual minutes of news coverage on science, space, and technology related stories, by 2001, just over 200 minutes of similar content was provided. Regardless of a slight increase during subsequent years, by 2008, science and technology content returned to only 210 minutes for the year. Since then, nightly news has seen a moderate increase in stories with science-based content, but still has not come close to the 1999 mark (National Science Board, 2010, pp. 7-14).

One might argue that the decline of scientific-based content on nightly news programs is due to the decrease in broadcast television as a source for news content. While it is true that more audiences are turning to online sources for news content, studies show that television is still the primary source of news for Americans (Mitchell, Gottfried, Barthel & Shearer, 2016). Thus, television news outlets should continue providing information about scientific inquiry and discovery due to its value in informing the public of scientific advances and influencing public policy and decision-makers (Crece, 2015).

Given the value of scientific innovations and discoveries in society, journalism schools continue to train students and equip them with the necessary skills to cover the sciences. The present research captures the experiences from an innovative project at a university in the Midwest that used a service-learning approach where students participated in a partnership with scientists to produce more engaging science stories and overcome some of the criticisms that have dogged science journalism (Amend & Secko, 2012; Bubela et al., 2009; Dentzer, 2009; Holland et al., 2011)

Literature Review

Science News Consumption

As societies around the world develop and evolve based on scientific research and innovations, the Internet has become an important source of information on science communication. Nevertheless, traditional media such as newspapers, television, and magazines still play a critical role as sources of layperson's information about science and in promoting science and information literacy (David, Garty & Tsabari, 2020; National Science Board, 2012).

Nelkin (1995) is widely acknowledged for constructing a frequently cited benchmark of what constitutes excellence in science communication: Good science journalism should be able to assess the appropriateness of scientific research, stay apprised of advances in sciences, and make choices related to perceived personal risks.

Previous studies have found that university and private industry scientists are generally willing to participate in media interviews in order to educate the public and engender interest in the scientist's specialty. Other scholars have discussed such willingness to interact with the

media by delineating the various roles that scientists take on when they grant media interviews. Those roles include: the political or social activist wanting to shape public opinion on an issue; the popularizer of science wanting to create more public interest in science; the commercializer wanting to create more industrial and commercial application of science; the advisor wanting to provide advice to the public; and the science manager who provides information on a scientific endeavor. Additional benefits scientists derive from serving as media sources include personal satisfaction, public recognition, employer recognition, political recognition, and peer recognition (DiBella et al., 1991).

Dahlstrom (2014) recommends using narratives and storytelling techniques in science communication and cites four factors of narrative communication identified by Glaser et al. (2009) that could improve science communication: dramatization, emotionalization, personalization, and fictionalization.

But some science journalists still face criticism for poor reporting, a tendency to misrepresent statistics and hype scientific progress (Bubela et al., 2009; Cassels et al., 2003; Zavolokina, Dolata & Schwabe, 2016). Other scholars have pointed out that science journalists face institutional and professional obstacles such as lack of space for science stories, deadline pressures, budget and staff cuts, and lack of reliable sources (Amend and Secko, 2012; Secko et al., 2013).

Despite these obstacles, scientists themselves recognize the important role played by the media in spreading the word about scientific advancements. Science journalism remains an essential form of science communication and represents the primary source of people's knowledge about science. In the U.S., television, daily newspapers, and online media make up 80% of the sources people consult for information about scientific topics (Committee on the Science of Science Communication, 2017). A recent study reporting on the health effects associated with cell phone radiation adds that science journalism is uniquely positioned to make scientific research understandable and relatable to the public (Elliot, 2019).

In 2011, Besley and Nisbet published an article identifying attitudes of scientists about the media. The researchers noted that while scientists believe the public knows too little about science, these same scientists also believe that the public does not trust scientists to provide clear and accurate information. Besley and Nisbet (2011) cite a Wellcome Trust study (MORI/Wellcome Trust, 2001) that found scientists feel the public has greater trust in the media over university scientists to communicate information about science. Conversely, scientists themselves lack the same confidence in the news media, describing journalists as the "hardest [group] to talk with" about research and rating television news coverage on science as only "fair" or "poor." This same study found 35% of scientists claiming the main barrier to "greater understanding of science" among the public was the media itself (Besley & Nisbet, 2011).

Anderson et al. (2011) investigated the relationship between trust in institutions (scientists and government), the media, and nanotechnology with the goal of exploring "how trust in institutional sources of information about nanotechnology develops among members of the U.S. population," and found a correlation between the use of media and the level of trust an individual exhibits toward science and scientists.

Additionally, Hmielowski et al. (2014) reviewed several studies on media use and trust in scientists, finding a strong correlation between the use of specific media outlets and the level of trust in scientific research. Greater use of conservative news outlets was associated with lower levels of trust in scientists, especially in connection with global warming.

Recognizing a need, Majetic and Pellegrino (2014) note the many efforts for increased science literacy among the public. These researchers themselves set out to provide one solution by developing a college-level general education course in environmental science specifically aimed at non-science majors. In preparing for the course, the researchers noted the efforts of

several others attempting to increase science literacy over the past two decades. Majetic and Pellegrino's (2014) assessment of these efforts states, "All of these projects focus a great deal of effort on critical reading of science reports in the media and often ask students to think about the accuracy of the science presented in each report" (p. 108). Instead, the authors, "…suggest that this gap would best be addressed by a combination of information and science literacy instruction, providing opportunities for students to develop skills that allow them to identify and access the scientific research publications underlying news reports" (Majetic and Pellegrino, 2014). In doing so, they ask the question, "How can students read science information critically if they are unaware of the source of the science content in the first place?" (p. 108).

Majetic and Pellegrino's (2014) solution for increasing awareness of the source of science content may be one that indeed improves students' scientific understanding, but consider how this understanding might increase if students interact directly with the scientist. The direct interaction between student and researcher could lead to increased clarity on the part of the non-scientist in understanding the research being conducted. An effort to facilitate direct interaction between science researchers and journalism students in such a manner using the service-learning approach is the basis for an educational experiment described below.

Service-Learning

Service-learning is a teaching approach that connects students to their communities, allowing them to develop knowledge, skills, and values while meeting identified needs in a community (Hall, Lorenzo, Matte, & Mozolic-Staunton, 2018; Miller et al., 2017; Muturi, An & Mwangi, 2013). When planning a service-learning activity, four components are needed: active participation of students that requires collaboration with the school and the community; integration of the academic curriculum to enhance the learning experience of the student; use of knowledge and skills of pedagogy in real-world situations; and reflection on the experience to enhance learning for students (Davies, Curtin & Robson, 2017; Miller et al., 2017; Stringfellow & Edmonds-Behrend, 2013). Dubinsky (2002) describes service-learning as combining these three axes: "learning (establishing clearly defined academic goals), serving (applying what one learns for the communal/societal benefit), and reflecting (thoughtful engagement about the service-learning work's value)". In short, service-learning is "learning-by-doing for others" (Dubinsky, 2002, p. 64).

Service-learning as a pedagogical approach has its origin in the philosophical work of John Dewey, who argued that the best learning takes place at the intersections of the classroom and real life settings and must be accompanied by action and reflection (Dewey, 1938). According to Dewey, learning takes place when students identify problems, try to solve them in real life, and construct meaning through the interaction of knowledge and experience (Bressers, Mwangi, & Smethers, 2016). Using Dewey's ideas, Kolb (1984) developed a four-step experiential learning model that included knowledge gained by students in real-life through experience, reflection, conceptualization or hypothesis-making, and experimentation. The community where service-learning is taking place provides the site for experience, which in turn informs conceptualization and hypothesis-making through constant reflection that is guided by an instructor.

Since the development of Dewey's theory, service-learning has gained wide acceptance as a pedagogical approach; the American Association of Colleges and Universities has praised service-learning as a high impact activity that engages students and improves learning (AACU, 2007). The approach has been widely used in mass communication curricula (Gasher, 2020; Nishimura & Yokote, 2020; Panici & Lasky, 2002; Valencia-Forrester, 2020; Young & Giltrow, 2020).

In fact, an increasing number of universities worldwide are now incorporating international service-learning as a mandatory part of their education. International service-learning is described as organized learning experience overseas that blends community needs with clear learning objectives (Davies, Curtin & Robson, 2017; Hall, Lorenzo, Matte, Mozolic-Staunton, 2018). Another study argues that besides serving as a learning opportunity, service-learning can help students develop sensitivity to social problems (Ocal & Altinok, 2016). Service-learning has also been used to help medical students understand the social context of aging by having them spend time in senior housing facilities (Miller et al., 2017).

Scholars in technical communication have recognized the significance and importance of service-learning. Henson and Sutliff (1998) argued that service-learning is well-suited to technical communication and that such collaborative writing enhances learning. Matthews and Zimmerman (1999) went a step further and suggested redefining technical communication to include a component of service-learning. Integrating service-learning projects into technical communication allows students to practice the skills they learn in their introductory and advanced courses and to experience the challenges of technical communication.

A successful partnership is critical to a positive learning experience in any service-learning project. There are three recommended approaches when it comes to identifying service-learning partners: collaborating with an organization that the instructor has experience with, letting students find their own service partners, or having both students and instructors locate organizations/clients together (Chong, 2016).

This project used the first approach. Journalism students in an advanced video production course partnered with a community of university scientists throughout the semester to identify the best way to solve a perpetual problem: how best to communicate science to non-scientists through journalistic stories. Students enrolled in the class were typically at senior level with a few juniors. As a result, students were comfortable with the video production process, having previously completed at least two other video related courses in their curriculum. The class met twice a week to reflect on what the students were learning and to use their experience in developing better journalistic skills for storytelling. Reflection is a critical part of service-learning and has often been used as a form of examining and measuring what students are learning through service-learning (Huckin, 1997; Scott, 2004). Meaningful reflection allows students to examine their experiences and actions and contemplate ways they could improve their efforts (Scott, 2004).

Methodology

After receiving Institutional Review Board approval, the project was introduced as a modification of a client-based corporate video production course where students perform the work of creating video products for a "customer." In this case, each client was a research scientist with grant funding awarded by the National Science Foundation at a state university in the Midwest. NSF funding of the scientists' research was an important component to the project because of the distribution channel, Science360.gov, and the requirement that videos featured on the site have a direct connection to an identified NSF grant number. Prior to the beginning of the semester, the instructor formed a partnership with video producers at NSF including an agreement that the instructor would provide video products meeting quality standards expected of NSF that communicate the science. In return, NSF agreed to distribute those videos meeting quality standards through NSF-sponsored outlets including www.Science360.gov and/or The Knowledge Network, NSF's cable TV channel.

At the beginning of the semester, students were given a list of researcher-partners and an abstract of the research being conducted. Students then selected the researcher-partners to work with during the remainder of the semester. While the final product would be an approximately 3-minute video designed to communicate and promote the research, several

other projects were assigned in an effort to improve the final product. The first assignment challenged each student or team to design their own production company title and create a production stinger similar to those used for commercial film or television productions. Stingers are audio cues that mark video transitions. This stinger would serve to identify the production team and their products.

Next, students were required to make direct contact with their researcher-partner for an initial attempt at understanding the needs of the partner. A needs analysis was completed by each team after a thorough interview with the partner, followed by submitting a synopsis of the students' video project. To successfully accomplish these tasks, each production team was required to extensively interview and consult with their partner to assure a basic understanding of the research being conducted.

Once the needs analysis and project synopsis were complete, teams were required to produce a basic how-to video on a topic they already understood well – a video production principle (i.e. audio recording, lighting, camera operation, etc.). The purpose of this assignment was to help students understand the detail required in successfully explaining a process – the assumption being that once students understood the need to explain even simple processes in minute detail, they would be better prepared to dissect the client's research.

Later, each student team was required to complete a script to be used in producing the final video product. The final script required approval from the instructor to assure clarity and professionalism. Scripts were presented in two basic formats – one used narration to tell the main elements of the story, supported by sound bites from researchers; the other used a cinéma vérité approach where the story was told without narration primarily by stitching together sound bites from several interviews conducted with researchers, graduate students, and others directly associated with the research project.

Of the 12 videos submitted to NSF, 11 were accepted – each featured on www.Science360.gov. Additionally, one of the videos was submitted to a national competition for broadcast students and was recognized as a Best of Festival winner, a status achieved by only 11 student productions from a pool of more than 1,300 entries. Other video projects from the class also received state and regional awards for quality of content. While the goal of the project never was to attain recognition through awards, this achievement certainly added validation to the success of the program.

Over the course of two semesters teaching the course in the manner described, a total of 17 students had completed the course. Recognizing the small sample size and limitations related to this concern, the researchers sought responses from each student using Facebook or personal email addresses. However, responses were sought well after the course had completed. In a few cases, no contact information was available, therefore the students could not be reached. Because the students had already moved on from their university studies, only 10 (58.82%) of the 17 students responded to the request to complete the questionnaire available through Qualitrics.

The student questionnaire used a 5-point Likert scale that was then collapsed to three categories (positive, negative, neutral) to gauge the perception of students and scientists regarding the partnership. To collect data from researchers who interacted with the students, a separate questionnaire was sent via email to these faculty members. Within this group, 9 of 12 (75%) researchers responded.

Each questionnaire sought responses to similar questions, though from different perspectives (student verses researcher). The items on each questionnaire related to each research question, addressing issues related to the quality of understanding the scientific process, the storytelling, and the partnership between journalist and researcher.

Results

Over the course of two semesters, each team of journalism students produced a single video ranging in length from 1:35 to 9:28 minutes. During the first semester, students generally worked in teams of two. During the second semester, students worked individually although they were allowed to collaborate with classmates. A total of 12 videos were produced. In addition to the production of the videos, students increased their understanding of the science in their assigned research projects. At the beginning of the semester, students were barely able to pronounce the words in the title of the abstracts connected to the research projects. By the end of the semester students could clearly explain the research being conducted, the purpose, and the benefits. Additionally, students built personal relationships with their researcher-partner, which allowed for open communication and increased respect and understanding by both parties. Students better understood the science along with its importance to the general population. Scientists, in turn, developed greater respect for the students' work in producing the video products.

As for the science research-partners, most came away with a very positive experience after working with the student producers. Often, the researchers found the videos themselves to be useful in communicating their research to lay audiences and other constituents. A common tone from the researchers is illustrated through one specific comment where a researcher stated, "This was … my go to resource to mention in my more recent NSF grant proposals under broader impact of that research project." Another researcher shared, "The video was great, and we were able to use it both to introduce prospective students to my research program, as well as add a link in an NSF report related to our Broader Impacts." The comments featuring the unsolicited connection with the NSF demonstrate added value and utility of the videos.

While the feedback from the researcher partners was overwhelmingly positive, there were some drawbacks and areas needing improvement as the program continues. One researcher noted, "…there were issues regarding insufficient information between the featured scientists and the students." Others shared concerns over the lack of scientific knowledge on the part of the student producer, noting that while enthusiastic, the students' lack of scientific experience led to inaccurate information in some cases. Still, when asked if they would participate in a similar project in the future, all the researchers said yes, although one mentioned she would be unwilling to pay for the video.

Our research questions are informed by a variety of items in the questionnaire that were combined for accuracy and comprehensive responses.

RQ1. What is the impact of the service-learning model on the trainee journalists' ability to report science-based stories?

Just over half of the students said the service-learning approach had a positive impact on their ability to report science-based stories. An additional 26% said it had no impact while 23% rated the impact as negative.

RQ2: How do the trainee journalists perceive the involvement of the science partners in the storytelling process?

Here again, just over half of the students rated their experiences as positive, 26% neutral and 23% negative, illustrating that the partnership and regular interaction with a scientist over time can yield beneficial results.

RQ3: How do the trainee journalists perceive the client-based approach to storytelling compared to the traditional journalism training process?

Responding to the partner-based approach, 67% of respondents rated the approach positively compared to 22% who were neutral and 11% who rated the process negatively when compared to traditional courses.

RQ4: How do the trainee journalists perceive the impact of the client-based training approach on their ability to tell other complex stories?

With this question, we attempted to tease out the residual effect of the partnership approach to education. According to 70% of the students, this approach was useful beyond the life of the project.

Discussion

This experimental project had five primary goals: 1) to increase the students' understanding of video work for partners who control the content message; 2) to increase the students' knowledge and abilities in video production and visual storytelling; 3) to develop a theory-based partnership approach as an alternative to the traditional reporting method in reporting scientific stories; 4) to increase the science literacy of students; and 5) to help students gain experience necessary in future assignments in dissecting complex content in order to tell a story in a conversational manner understood by a lay audience.

Regarding RQ1 and RQ2, a majority of the students (51%) felt that the service-learning approach that paired them with science partners had a positive impact in helping them in their work as trainee journalists. Students reported that they found their long-term collaboration with a client invaluable in helping them produce better stories and in breaking down the content to digestible bits for a lay audience with one student saying "…the partners were responsive and easy to meet with." They also understood that the students were non-scientists and, therefore, communicated with them in ways that were easy to understand, with students advising those who want to try a similar approach in the future that "…the key is to spark a relationship within the months you are working with that person."

Previous literature has identified that scientists lack confidence in the news media, defining journalists as the "hardest [group] to talk with" about research and rating television news coverage on science as only "fair" or "poor" (Besley & Nisbet, 2011 p. 649). One way to engender trust, as demonstrated by this research project, may be to create long-term partnerships between journalists and scientists in telling science-based stories.

However, one student observed that when she suggested editing the video to make it shorter, the scientist objected, wanting to include everyone in the project so no one felt left out. This is an interesting observation since the students still viewed their work through a journalism prism where content used must add value to a story, while the scientist viewed the project through a relationship prism. The key to the integrity of the final product may be to forge an early understanding that the student producers shall determine the final product or to use the relationship for mutual education to help the scientists understand the journalistic process even as the scientists are helping the student journalists understand the scientific process.

When asked to compare the client-based approach to the traditional journalism approach in reporting stories, 67% of students felt the client-based approach was much better with some saying "…The NSF project involved a lot of language processing and how to use visuals. It broke things down in a way that gave clear and concise explanation as opposed to using any specific 'angle' or making use of 'journalistic rules.' In that sense it was creatively free/unrestrained and that added to the quality of the storytelling. In that sense it was creatively free…" and "It feels less restrictive…" This finding speaks to the importance of cultivating relationships and investing time in assignments. This finding also suggests that while traditional journalism approaches all assignments with a one-size-fits-all methodology where journalists parachute onto a news scene and proceed to report on assignments as quickly as possible, we should perhaps rethink science communication and other complicated assignments where journalists do not have a solid background in those subjects. The creative aspect of the content they produced is also in line with Dahlstrom's (2014) recommendations in

using the narratives and storytelling techniques in science communication because such a technique helps in content dramatization, emotionalization, personalization, and fictionalization, and ultimately the ability to learn and retain information. As students reported:

- "It was more story-based and in-depth, which was a cool difference (especially since I'm more interested in the creative side of stuff). We could use our creativity more and it was up to us how we wanted to produce it."
- "The NSF project involved a lot of process language and how to [sic] visuals. It broke things down in a way that gave clear and concise explanation as opposed [sic] to following any specific angle or making use of 'journalistic rules.' In that sense it was creatively free/unrestrained and that added to the quality of storytelling."
- "It feels less restrictive."
- "I used journalistic approach for the NSF project because it was necessary to show the unbiased human and scientific impact of the research. The storytelling was a bit dramatized, but that was a large portion of the project."
- "It was artsy fartsy not as informative as it could have been."

Regarding the residual effects of using this immersive approach in tackling other complex subjects, 8 of 9 students who responded felt they could carry their experiences from this project to future assignments. But they also added two other observations worth considering when reporting on other complex subjects. One said, "Because this project was visual, you could see what the person was trying to communicate through video and just telling it by word of mouth." Others reported that such projects require a convergence approach that combines video, graphics, podcasts, writing, and other multi-platform formats. Through the partnership approach, the students became better communicators because they had time to master the subject and the creative freedom to tap into their basic and advanced journalism classes to tell the stories.

Scholars have also wrestled with the question of whether formal science training or a background in the sciences is necessary for science journalists. Dunnwoody (2004) reviewed several studies and concluded that newsroom socialization and the number of years on the job were more important predictors of excellence in science communication than a formal education in the sciences. That these journalism students with no formal training as scientists were able to understand scientific content and produce award-winning narratives supports Dunnwoody's findings.

Overall, this project offers a novel way to teach science communication through a service-learning partnership. Literature shows that while service-learning is widely used in other forms of communication such as public relations and traditional journalism, it is less used in science communication (AACU, 2007; Panici & Lasky, 2002). The fact that students who took part in this experimental project won regional and national awards for the content they produced suggests that service-learning yields rich rewards in teaching science communication. The approach used in this project also addresses fundamental institutional and socialization obstacles such as lack of trust that has hindered excellence in science communication. It also allows non-scientist journalists to develop a scientific context for their reporting, and encourages flexibility, creativity, and overall excellence in the final product.

Conclusions

Considering the five primary goals of this experimental project -- 1) to increase the students' understanding of video work for partners who control the content message; 2) to increase the students' knowledge and abilities in video production and visual storytelling; 3) to develop a theory-based partnership approach as an alternative to the traditional reporting

method in reporting scientific stories; 4) to increase the science literacy of students; and 5) to help students gain experience necessary in future assignments in dissecting complex content in order to tell a story in a manner understood by a lay audience -- we feel it to be a success overall. However, there are certainly improvements that can be made as the course moves forward. While the scientist-journalist partnership may not make for highly objective storytelling, the content becomes more accurate and exacting as the two work together in communicating the necessary information.

Journalists enjoy telling stories that are unique, entertaining, and engaging to their audiences. Science information can serve as the content of those stories. When scientists recognize this potential and proficiency and both scientist and journalist demonstrate mutual respect for one another's specializations, science information is communicated to broader audiences with the creativity desired by journalists and the accuracy desired by scientists.

Comparing the approach used in this experiment with a traditional journalistic one, two-thirds of the student journalists were in favor of the new approach. As noted in the discussion, this attitude speaks to the value of cultivating relationships between professionals of all types. Communicating complex information, science or otherwise, cannot effectively be done simply by the journalist who rushes into a new environment, taking only a few minutes to observe what is happening. A narrative storytelling technique as suggested by Dahlstrom (2014) draws audiences to the content, but the partnership with an expert on the subject aids the journalist in ensuring the needed accuracy.

Regarding the increase in science literacy on the part of the journalism student, it appears that Dunnwoody's (2004) observations may be accurate; a reporter's socialization and experience are greater predictors of excellence in communicating about science than formal education in the sciences. Once again, it seems it is the partnership that matters most. This partnership should be a consideration as scientists are putting together a team. Including an experienced communicator can aid in meeting the communication requirements of many major granting agencies while also promoting good science through the media.

As journalists consider their coverage of local, national, and international news, training in communicating complex topics can elevate the content found on the evening newscast. If reporters are versed in doing more than simply gathering the low-hanging journalistic fruit of their communities, audiences should notice an increase in news content that has a more lasting impact than a story about the latest burglary at the local convenience store.

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