Scientists' Communication with Media: A Systematic Literature Review

Abstract

As the field of science communication has grown, researchers have determined that it is essential for scientists to communicate and interact with the media, yet many prefer to avoid the media. This systematic literature review made a comprehensive account of the reasons why some scientists communicate with the media and others avoid this task. The researchers found that many scientists who choose to work with the media believe they, or society, will benefit from the experience. Some of these benefits include career acknowledgement, increased funding, and sharing scientific knowledge. Scientists avoided working with the media due to a lack of communications training, having a negative influence on pulic perception or policy, inadequate time and/or funding, the public's lack of scientific knowledge, or the possibility of unwanted media attention. The advantages and disadvantages found in this paper can be used by communication trainers, employers, or other scientists to understand why some scientists may hesitate to interact with the media and also what may incentivize them to do so anyway.

Keywords: Science communications, agricultural communications, scientists, media, media training, communications training, media relations

Introduction

Communication training for scientists is becoming more common (Besley & Tanner, 2011). This is probably best demonstrated through the number of science communication centers and workshops now available for scientists, academics, and graduate students. Many of these are hosted by professional organizations, such as the American Association for the Advancement of Science's Center for Public Engagement with Science & Technology; or universities, such as Stony Brook University's Alan Alda Center for Communicating Science, Texas Tech University's Center for Agri-Science Communications, or the University of Florida's Center for Public Issues Education in Agriculture and Natural Resources.

Despite the growing number of communication centers and workshops being developed, many scientists are still not receiving the training they need to effectively communicate their scientific findings and messages. In a survey of science communication experts in 2011, only 17% reported spending any time giving communication training to bench scientists or engineers within the previous three years (Besley & Tanner, 2011).

It is crucial for scientists in all fields, but agriculture in particular (Ruth et al., 2005), to receive communication training. Instruction in communications should allow scientists to do the following five items:

1. Make the message understandable to a range of audiences
2. Ensure a range of audiences view scientists as trustworthy and credible
3. Ensure a range of audiences view scientists as a group that wants to listen to the audience's concerns
4. Ensure a range of audiences view scientists as caring and concerned

5. Frame or shape messages so they resonate with audiences' values or predispositions (Besley, Dudo, & Storksdieck, 2014).

Agri-science topics such as genetic modification, organic farming and ranching, pesticide use, and others are being discussed by the public on a regular basis. Although these scientific ideas and technologies are sometimes discussed in terms of ethics and public policy, many consumers do not understand the science behind them. The Annenberg Public Policy Center (2016) found that despite widespread support for mandatory labeling of GM foods, 58% of Americans acknowledged having a fair or poor understanding of GMOs. Americans need a trusted source that can provide accurate information regarding agri-science issues.

This trusted source may very well be the scientists of agriculture. In a study conducted by the Pew Research Center, 35% of U.S. adults trust scientists "a lot" to give complete and accurate information when it comes to the health risks and benefits of eating genetically modified foods (Funk, 2017). One way that scientists can directly reach the public is through the media. This systematic literature review reports why scientists may or may not choose to interact with the media.

Agricultural Scientists' Media Relations

In 2005, Ruth et al. conducted a survey of SAAS (Southern Association of Agricultural Scientists) members' opinions on, and perceptions of, the news media. The researchers found that the agricultural scientists thought local news was less biased than national news (Ruth et al., 2005). Respondents also felt that agricultural news media were less biased, whether local or national (Ruth et al., 2005). Lastly, the authors found that scientists felt confident in their media relations capabilities as a whole, but expressed a need for more training in communicating in crisis situations and writing newspaper columns (Ruth et al., 2005).

Beyond Ruth et al.'s (2005) study, there is a lack of research that address the media relations skills of agri-scientists, or scientists in general. This literature explores the modern literature available on the subject.

Changes in Science Journalism

Science journalism is a rapidly changing field. Schäfer (2017) emphasized that "the guidance science journalists could provide is more needed than ever" (p. 57). While the number of science journalist positions in traditional media is decreasing, many science journalists are using creative avenues to continue their careers (Schäfer, 2017). These journalists are turning to books, websites, social media, and media run by third party foundations to maintain their position as science promoters and "watchdogs" (Schäfer, 2017). This study does not distinguish between traditional and non-traditional science journalists/media approaches.

Purpose and Research Objectives

With so much criticism of and distrust in science, effective communication is imperative. Yet, many scientists are uncomfortable with communications. Some agricultural communications faculty are participating in programs to help scientists communicate, but more information about scientists who do or do not communicate is needed. The purpose of this systematic literature review was to review past studies that included why scientists are, or are not, willing to communicate with the media as this can provide direction for future communication training of agri-scientists. The following research questions guided this study:

RQ1: What reasons does the literature provide for why scientists communicate with the media?

RQ2: What reasons does the literature give for why scientists do not communicate with the media?

Procedures

This study was a qualitative, systematic literature review. The goal of qualitative research is to create a holistic picture and in-depth understanding of an idea instead of a numerical analysis of data (Ary, Jacobs, & Sorensen, 2010). Systematic literature reviews create a detailed and comprehensive search strategy *a priori* and usually set a goal to synthesize relevant studies to a topic (Uman, 2011). Three researchers collected all data for this study.

Data Sources and Search Strategy

Four journals were used to conduct the study upon recommendations of an assistant professor of science communication and an associate professor of agricultural communications who are both experts in scientist/media relations. The journals chosen were the *Journal of Applied Communications*, *Philosophy of Science*, the *Proceedings of the National Academy of Sciences of the United States of America*, and the *Journal of Science Communication*. In systematic reviews, it is important to determine a list of key terms to search (Uman, 2011). The selected journals offered a wide representation of scientist/media interactions in general and agricultural scientists in particular. Key phrases used in this study to search each journal were "scientist communications," "scientist media," and "scientist reporters." Other screenings were used to only select articles that were written in English and had the full-text version available online. Articles included were published since 2003; the researchers chose this timeframe because that was the year then CEO emeritus of the American Association for the Advancement of Science, Alan Leshner (2003), called for greater public engagement with science. Research in the field of science communications grew as a result.

Initial inclusion/exclusion criteria resulted in 56 articles. After the researchers reviewed the articles' abstracts, 12 were determined to relate to the research questions and read in entirety. It was evident from the abstracts of the 44 papers that were excluded that they did not contain

information about media relations and scientists. Four articles were removed by the researchers after being read in their entirety because they did not address reasons why scientists do or do not work with the media. A total of eight articles were coded and fully analyzed. The researchers found answers to the research questions in the articles and organized the data into themes.

Data Collection

Once a comprehensive list of all articles was retrieved and met inclusion criteria, the articles were reviewed in full. Uman (2011) explained that at least two reviewers are needed to establish inter-rater reliability. In this study, three coders fully reviewed included articles. Each researcher individually reviewed the articles, made notes, and determined themes.

Data Analysis

After each article was read by all three researchers, the data were coded using open coding by creating concepts from the articles that answered the two research questions. Once concepts were found from open coding, axial coding was used. Axial coding is taking one category at a time, and analyzing the concepts within the categories and between the categories (Tesch, 1990). The final stage of coding was selective coding: finding common themes from the categories found (Tesch, 1990). Sorting the literature into themes or categories is the most popular approach to a literature review (Cronin, Ryan, & Coughlan, 2008).

Trustworthiness

Trustworthiness can be explained as the extent to which findings relate to the truth, or the confidence to which the findings represent the data (Dooley, 2007). Lincoln and Guba (1985) explained that trustworthiness contains four aspects of establishing qualitative research's rigor: credibility, transferability, dependability, and confirmability. To establish credibility, the researchers consulted each other to be sure the data was intrepeted correctly. Transferability was

established by taking notes and keeping records of the entire coding process. To establish dependability, the researchers maintained records of the data by keeping the original articles read and all researcher notes. A source of invalidity in qualitative studies can be researcher bias (Ary, Jacobs, & Sorensons, 2010). Researcher bias could have been a factor in this study since one of the researchers is involved in a media training group for agricultural scientists. To control for this, the researcher remained open-minded when reading the articles and coding. The remaining two researchers were not involved in any media training.

Give a description of each article, maybe in a table

Findings

RQ1: What reasons does the literature give for why scientists communicate with the media?

To answer RQ1, three themes emerged: (1) improve reputation, career, or funding (2) share scientific knowledge and influence policy, and (3) fulfill a duty to communicate science.

Improve Reputation, Career, or Funding

Two articles discussed how working with the media could lead to an improvement of reputation or career and/or acknowledgement (Dijkstra, Roefs, & Drossaert, 2015; Peters, 2013). In a sample of Dutch biomedical scientists and science journalists, some respondents felt that being mentioned in the media would help them be better known, and media attention could possibly lead to grants or promotions (Dijkstra et al, 2015). Peters (2013) found that scientists may receive reassurance that their work has made a positive impression through media coverage. "This suggests that media visibility of scientists, by and large, conforms to normative expectations in the social contexts relevant for scientists and is perceived as an indicator of the broader impact of their work" (Peters, 2013, p. 14105).

Participants of the study conducted by Dijkstra et al. (2015) believed that more exposure in the media could lead to an increase in funding. Nielsen, Kjaer, and Dahlgaard (2007) reported similar findings that "scientists are tempted to use the news media to make their own science more visible, with a view to attracting further external funding" (p. 11). Ruth-McSwain and Telg (2008) found that, "the financial support and third-party endorsement that result from media relations efforts were perceived (by agriculturalists) as the most valuable outcomes" (p. 5). Participants said they believe that financial survival without the media is impossible (Ruth-McSwain & Telg, 2008). Scientists also base whether a communication effort is successful "less on whether their message has reach the media audience undistorted and more on whether it has alerted funders…to the relevance of their work" (Peters, 2013, p. 14107).

Share Scientific Knowledge and Influence Policy

If scientists understand that sharing scientific knowledge assists stakeholders when making decisions involving science, it may encourage scientists to broadcast their research (Dijkstra et al., 2015). Scientists may want to contribute to improving the public's scientific knowledge because, "an informed public is able to make more valid decisions regarding their own health and behavior" (Dijkstra et al., 2015, p. 9). Dijkstra et al. (2015) also found that scientists may work with the media in order to possibly influence policy making. "Since researchers possess knowledge that is often highly relevant to public policy issues it can be argued that researchers ought to participate in public debate," (Dijkstra et al., 2015, p.3).

Fulfill a Duty to Communicate Science

Several articles included the idea that scientists feel a responsibility to communicate (Peters, 2013; Lundy, Ruth, Telg, & Irani, 2006; Dijkstra et al., 2015). "Scientists nowadays perceive a duty to talk to the media about their research," (Peters, 2013, p.14105). Lundy et al.

(2006) found that respondents felt responsible for helping people understand their agricultural discipline, but they felt less responsibility to assist people in understanding science in general. Dijkstra et al. (2015) concluded that many scientists feel it is their duty to participate in science-media interactions in order to share knowledge with a broader audience.

RQ2: What reasons does the literature give for why scientists <u>do not</u> communicate with the media?

To answer this research question, seven themes emerged: a lack of time and/or funding, the public's lack of scientific knowledge, having a negative influence on public perception or policy, the media's lack of resources, the need for communications training, being unsure of their employer's communication policies, and gaining unwanted media attention.

Need for Communications Training

Several papers cited lack of training as a fundamental reason for why scientists do not interact with the media (Silva & Bultitude, 2009; Scheufele, 2013; Lundy et al., 2006; Nielsen et al., 2007; Ndlovu et al., 2016; Dijkstra et al., 2015). Silva and Bultitude (2009) stated that training for researchers and scientists is "clearly required." Communicating with the lay public requires different skills than academic communication; Scheufele (2013) stated that many scientific foundations and universities have begun to implement communication training programs to combat this issue. If scientists do not feel comfortable communicating with the media due to lack of training, they will most likely not seek out journalists to spread their research.

Negative Influence on Public Perception or Policy

Although some scientists hope to use the media to have a positive influence on public perception or policy, many understand that using the media to spread research can have some

negative effects on public perception or policy as well. For example, scientists may choose to avoid communicating with the media due to avoid damaging their own reputation in the community (Dijkstra et al., 2015). “The most important disadvantage that scientists mentioned for scientists is loss in credibility, trust and status, which leads to reputation damage and affects one’s career” (Dijkstra et al., 2015, p. 10).

There is also a possibility that false information could spread if scientists use the mass media to communicate their research. This can cause scientists to feel a lack of control over exchanges with journalists and their results (Peters, 2013). Research can also be misinterpreted by a journalist or their audience, creating “unrealistically high expectations” for science (Nielsen et al., 2007). Dijkstra et al. (2015) also found that scientists believe the mass media can create sensationalism, which can “lead to the spreading of incorrect information and may induce anxiety and false hope among the public” (p. 10).

Many scientists understand that science featured in the media can be framed by journalists or politicians, which can also have a negative effect (Scheufele, 2013; Peters, 2013; Ndlovu et al., 2016; Nielsen et al., 2007). Framing is used by journalists to filter large amounts of information to determine what is important for their audiences to receive (Gamson, 1989). Goffman (1974) determined that all observers project their frames of reference onto the world around them. This includes journalists trying to make content relevant, interesting, or comprehensible to audiences. Unfortunately, it does not always contribute to the spreading of accurate and unbiased science. Recent technology, such as genetically modified organisms and nanotechnology, have been negatively framed by the public as “Frankenfood” and “the next plastic or asbestos” respectively (Scheufele, 2013). Peters (2013) found that scientists understand that their research could be “popularized.” This includes “the use of selected, simplified,

sensationalized, and pedagogically tailored messages when addressing the general public" (Peters, 2013, p.14103). While scientist fear popularization could misconstrue the science being spread because the messages are different than those discussed in the scientific arena, they are not completely disconnected (Peters, 2013).

Science is also a highly-politicized topic. A study in Zimbabwe found that some researchers do not publish their findings in a medium for the lay public because of the research's "politically sensitive nature" (Ndlovu et al., 2016). The same study found that 31% of the respondents waited five years to share their findings to public and policy audiences and 47% of respondents did not share their findings with public and policy audiences at all (Ndlovu et al., 2016). Many scientists realize that science shared with the public will inevitably be politicized (Nielsen et al., 2007).

Many scientists recognize that science is not always accurately portrayed by the media (Scheufele, 2013). The National Academy of Science collaborated with Hollywood writers and directors to create more accurate portrayals of science in popular media through the Science and Entertainment Exchange (Scheufele, 2013). Efforts are being made to portray science and scientists correctly, but some scientists may shy away from the media until this is completely resolved.

Lack of Time and/or Funding

Some scientists view communicating with the media as a strain on two of their most valuable resources: time and money. Eighty percent of scientists employed by universities in a study by Ndlovu et al. (2016) cited a "lack of time and heavy teaching workloads" as obstacles to public communication (p. 16). Interacting with the media adds to a scientist's normal workload because it requires time and effort (Dijkstra et al., 2015). Focusing on media that reaches a

targeted audience can be considered time consuming, difficult, and not worth the effort by scientists (Ruth-McSwain & Telg, 2008).

Lack of time and deadlines are issues shared by journalists as well. Journalists are usually on a tight schedule to publish a story and stated that time constraints of scientists can sometimes be an issue (Dijkstra et al., 2015). Sometimes, neither scientists nor journalists have time for face-to-face chats and rely on email or phone (Ruth-McSwain & Telg, 2008). This can cause strain on completing a story or maintaining a relationship.

Having a relationship with a journalist is crucial to be viewed as a valuable source, however, scientists may feel that they do not have the time needed to devote to a relationship with journalists. It is difficult to work with the media without having a relationship of some kind (Ruth-McSwain & Telg, 2008). Peters (2013) used the metaphor of academic and public communication as two arenas with scientists having to adjust to the public arena structured by journalists. Dijkstra et al. (2015) explored the many different aspects of the science-media relationship and how journalists and scientists both affect this relationship. The same study found that journalists perceived the science-media relationship as more positive than scientists do (Dijkstra et al., 2015). Ruth-McSwain & Telg (2008) stated that having a relationship with journalists is imperative to scientists' survival and scientists should establish mutually beneficial relationships. The same study found that many scientists do not understand how to establish this type of relationship, with many stating they do not want to "bother" journalists (Ruth-McSwain & Telg, 2008).

Scientists must also divide their already limited time with other career-benefiting forums: academic communications such as academic journals and conferences. Peters (2013) had reason to believe the Ingelfinger rule is still effective. This rule stated that being published in a scientific

journal is less likely if the results have already been reported by the mass media (Peters, 2013). Lundy et al. (2006) found that agriculturalists were more likely to contact the campus news organization than an outside journalist. Ndlovu, Joubert, and Boshoff (2016) determined that more than half (52%) of their respondents would "prefer to publish in journals without further engaging the public in their research work" (p. 13). The same study revealed that the majority of respondents preferred academic communication such as conferences and seminars over newspapers, social media, or blogs (Ndluvo et al., 2016). Perhaps most importantly, universities tend to reward academic publishing over communication with the lay public (Scheufele, 2013).

A lack of funding can also be an obstacle for scientists who wish to communicate to the public. Although some scientists view communicating with the media as a chance to increase funding (Dijkstra et al., 2015; Nielsen, Kjaer, & Dahlgaard, 2007; Ruth-McSwain & Telg, 2008; Peters, 2013), many feel that they do not have the financial means to communicate with the media to begin with (Ndlovu et al., 2016). Universities or organizations where funding is unstable may create constraints on scientists' public engagement (Ndlovu et al., 2016).

Public's Lack of Scientific Knowledge

While it has been proven repeatedly that a knowledge gap in the public does not affect the public's ability to understand science (Kahan, et al., 2012; Malka, Kronsnick, & Langer, 2009), this mistaken impression could cause scientists to doubt the practicality of public communications efforts. Peters (2013) found that scientists, particularly those in counties other than the United States, are not wholly convinced that the public is able to understand scientific findings. In a survey conducted by Lundy et al. (2006), respondents did not believe that the public understood their agricultural discipline or science in general. Seventy-nine percent of

respondents in one survey believed that "it would be difficult for them to explain scientific facts to journalists in a way that lay audiences could understand" (Ndlovu et al., 2016, p. 14).

Unwanted Media Attention

Some scientists simply do not want, or shy away from, media attention (Ruth-McSwain & Telg, 2008). This theme was only found in an article based on agricultural scientists, which may indicate a unique issue in this field. A participant in the qualitative study stated "there are a lot of people in this business that tend to shy away from doing press" (Ruth-McSwain & Telg, 2008, p. 5). A fear of negative press, or the media in general, may deter scientists' willingness to work with the media.

Employer's Communication Policies

Without strict guidelines, it may be difficult to know what is expected of scientists as communicators or even what is allowed (Ndlovu et al., 2016). Ndlovu et al. (2016) suggested that university research offices have clear communication policies to guide faculty and staff when engaging with the public. Universities' science communication policies should also be clearly stated in scientists' work contracts (Ndlovu et al., 2016).

Media's Lack of Resources

Scheufele (2013) recognized that there are less opportunities for science to be featured in the media. It is unclear whether a shrinking science and technology audience is due to less "news holes" devoted to the subjects or vis versa (Scheufele, 2013). In 1989, 95 newspapers had weekly science sections; by 2013, only 19 newspapers included weekly science sections (Scheufele, 2013). There are also very few science journalists left in traditional media (Scheufele, 2013). The lack of science in media creates a challenge for scientists looking to use mass media to spread their research.

Discussion/Conclusion/Recommendations

There is a boosted need for scientists to be sharing their developments with the public (Treise & Weigold, 2002). Researchers must understand why scientists choose to interact with, or avoid, the media. This will assist future recruiters for scientific communications training to explain to scientists how the training can benefit them and that they might be avoiding it for unrealistic reasons. The goal of this systematic literature review was to determine common themes in published literature discussing why scientists do or do not communicate with the media. The researchers found a greater amount of reasons for why scientists do not want to communicate with the media than why they do.

Research question one sought to find reasons why scientists communicate with the media. The common themes found included to improve reputation, career or funding; to share scientific knowledge and influence policy; and to fulfill a duty to communicate science.

Although scientists do not necessarily communicate with the media for personal publicity, they are willing to talk to the media for professional advancement. This especially applies to increasing research funding; this was the most common theme found for research question one by the researchers in the reviewed literature. It is important that scientists understand the benefits that are available to them when they communicate with the media.

The second research question sought to determine what the literature lists as reasons why scientists do not communicate with the media. The common themes found in the literature included focus on a lack of time and/or funding, the public's lack of scientific knowledge, having a negative influence on public perception or policy, the media's lack of resources, the need for communications training, being unsure of their employer's communication policies, and gaining unwanted media attention.

A repeated answer to RQ2 was that scientists avoid the media because they do not feel adequately trained to communicate with them (Silva & Bultitude, 2009; Scheufele, 2013; Lundy at al., 2006; Nielsen et al., 2007; Ndlovu et al., 2016; Dijkstra et al., 2015). This only enforces the need for more communications training opportunities for scientists and especially for agricultural scientists as found by Ruth et al. (2005). The institution's standards and policies for communicating with the media should be made clear during the communications training. If this is not done, it may cause more scientists to avoid communicating with the public after they are trained since Ndlovu et al. (2016) found that some scientists avoid working with the media because they are unsure of their employer's communication policies. The agricultural communications community should strive to have more communications training provided to agri-scientists through programs such as the University of Florida's Center for Public Issues Education in Agriculture and Natural Resources or Texas Tech University's Center for Agri-Science Communications.

Scientists seemed concerned about negative outcomes that could occur after communicating with the media. These included having a negative influence on the public's perception of themselves and/or their science and on public policy (Dijkstra et al., 2015; Peters, 2013; Nielsen et al., 2007; Scheufele, 2013; Ndlovu et al., 2016). It is worth noting that other studies found that scientists use the media to influence policy and share scientific knowledge (Dijkstra et al., 2015). More research should be conducted to understand whether scientists who work with the media to influence policy and share knowledge also share the belief that their work could ultimately have a negative influence on public opinion or policy.

Another common theme for research question two was a lack of time and funding. Much like the last RQ2 answer examined, an opposite answer was used for RQ1. Although RQ2 found

a theme of scientists who avoid working with the media because it could take additional funding (Ndlovu et al., 2016), other studies found that scientists use media appearances to gain funding (Dijkstra et al., 2015; Nielsen, Kjaer, & Dahlgaard, 2007; Ruth-McSwain & Telg, 2008; Peters, 2013). Further research should be made to understand why some scientists see working with the media as a financial strain, while others see it as an opportunity for a financial boost.

Unwanted media attention was only found in the article that studied agricultural scientists. (Ruth-McSwain & Telg, 2008). This could indicate that scientists in the field of agriculture fear that media attention on their research will result in negative feedback from the lay public. More research is needed to understand if this is a specialized issue for agri-scientists, and if so, why.

Many articles found in the search discussed studies done in other countries such as the Germany, Netherlands, and Zimbabwe (Peters, 2013; Dijkstra, Roefs, & Drossaert, 2015; & Ndlovu, et al., 2016). As these studies had strong recommendations and implications for a specific region or country, the researchers recommend that similar studies be conducted in the United States to get more specific data on American institutions, media, and scientists.

Although more themes were found for why scientists do not communicate with the media, several were still found on why they do. The researchers recommend universities and scientific organizations work to communicate these benefits to increase scientists' communication efforts. The most common theme found for why scientists communicate with the media was to improve their reputation, career, or funding. Because of this, the researchers recommended that universities and organizations promote this benefit to their scientists. This could encourage more media interaction and communications training participation.

The researchers also recommend that further studies be conducted that include different journals and key words to search for articles. This could increase the pool of studies used for a comprehensive compilation of reasons why scientists work with the media or not. More themes might emerge and more articles related to agriculture specifically could possibly be found helping to further scientific communications in agriculture.

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