Training in Policy Memoranda Writing for Early Career Scientists

Emily Moravec[1], Lily T. Nguyen, Avital Percher[2]

[1] University of Florida, Department of Astronomy Gainesville, FL 32607; Emerging Leaders in Science Policy and Advocacy
[2]National Science Policy Network
Corresponding author: emoravec@ufl.edu
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Executive Summary: The National Science Policy Network (NSPN) is a grassroots non-profit whose mission is to support the engagement of early career scientists in science policy and advocacy. Launched in 2018, NSPN provides training opportunities, funding, and programs to a network of over 300 members and 30 chapters across the United States. To fill the gap in available educational material for policy memorandum writing, NSPN held a two-day writing workshop in October 2018 for ten graduate students and postdocs in Washington, D.C. The event was also an opportunity to test an intensive workshop model.

The two goals of this workshop review are: 1) to advise science policy groups or similar entities who would like to host a policy memo writing workshop and 2) to provide a framework for how to write a policy memo. This review covers the rationale behind the workshop and its structure, the effectiveness of each workshop component, and suggestions for future workshop formats. We also highlight tips that were covered during the workshop and methods on how to write a memo for people with a scientific background.

The intended audience of this review is NSPN and constituent groups - universities, internal funding sources at universities, societies that might fund similar workshops, and anyone who would like to learn how to write a policy memo.

I. Introduction

The National Science Policy Network (NSPN) convened an inaugural two-day workshop (October 5-6, 2018) on the topic of policy memos, highlighting NSPN's strategic goals of providing training opportunities for its constituents. In particular, NSPN identified policy memo writing as an important skill set for anyone interested or working in the areas of science policy and diplomacy. Memo writing requires writers to take complex ideas and summarize the important information into a concise, accessible document. However, these skills are generally not taught in the course of traditional scientific training and often run contrary to traditional scientific writing styles. This led NSPN to organize a memo writing workshop and competition in partnership with the Journal of Science Policy and

Governance. The competition and workshop allowed participants to practice memo writing and to improve policy writing skills in a friendly environment.

The workshop focused on developing the science policy writing skills of early career scientists (graduate students and postdocs) with little to no experience in memo writing prior to this workshop through applied training coupled with expert feedback. Ten individuals from the four regional NSPN network hubs attended the workshop. Herein we provide the workshop structure and a summary of the key learning points along with commentary and opinions from workshop participants in the supplement. We believe the workshop format

effectively trained novices on the subject area and is a useful template for future workshops.

II. Memo writing workshop structure

i. Structure

The two-day memo writing workshop was designed to provide participants with background information on memo writing, experience writing memos in small groups, and an evaluation of the memos by policy experts. Members of NPSN constituent groups were nominated by their leadership to this workshop. Participants were invited based on availability and level of prior experience with memo writing. The goal was to give participants two different experiences with memo writing – spread out over two days. Participants were provided full prompts at the beginning of the first writing session (Day 1). During the second writing session, the participants created their own prompt from a list of suggested broad topics (Day 2). The schedule was as follows:

ii. Day 1 (Friday, October 5th, 2018)
American Association for the Advancement of Science (AAAS) Headquarters

> 9:00 - 9:30: Breakfast
> 9:30-11:30: Introductory talks
>> Kumar Garg, Fundraising and One Pagers
>> Shalin Jyotishi, Journal of Science Policy and Governance
>> Erin Heath, Communicating Science Through Policy Briefs
> 11:30-12:30: Lunch
> 12:30-16:00: Group Memo Write-up #1
>> *Teams had 3-4 hours to research and produce a one to two-page memo on one of two topics (topics were revealed at this moment).*
> 16:30-17:15: Peer review
> 17:30-19:00: Review by experienced policy writer, Candace Vahlsing

Dinner and Evening Activities following last session

iii. Day 2 (Saturday, October 6th, 2018)
Association of Public and Land-Grant Universities Headquarters

> 9:00 - 9:30: Breakfast
> 9:30-10:30: Debrief from previous day

> 11:00-14:30: Group Memo Write-up #2 (with a break for lunch)
>> One- to two-page memo on a topic of interest
> 14:30-15:15: Peer review
> 15:30 - 17:00 Review with experienced policy writer, Yvette Seger

End of workshop; Dinner for those who did not immediately leave town

iv. Structure of Day 1
As an introduction to policy memo writing, the workshop started with three lectures. The speakers had science backgrounds, but currently serve in policy roles. Thus, they were able to reconcile differences between scientific writing and policy writing.

Following the lectures, the main activity directly engaged workshop participants with a memo writing session. From a list of ten detailed prompts, participants voted on two final prompts to limit the option pool. Based on interest, the participants formed two groups of three and one group of four. The memo writing session lasted two hours instead of the originally planned three to four hours, which was sufficient for the initial session. To work in a collaborative, real-time environment, each group used Google Documents.

After the allotted time, groups exchanged their memos for peer review, where reviewers provided comments on the content and structure of the memo. Groups took approximately fifteen to thirty minutes to conduct reviews. The edited memos were then returned to each group. Each team used the remainder of the time to revise their memos according to the comments provided.

Candace Vahlsing, the Senior Advisor for Energy, Climate, and Environment for Senator Michael Bennet, then critiqued the memos and walked through each memo in a group discussion format. The scope included general feedback, as well as the strengths and weaknesses of each memo. Furthermore, she provided additional tips on how to improve memos and shared general advice regarding careers in policy.

v. Structure of Day 2

Day 2 started with a group discussion on Day 1. Participants voiced their opinions on what aspects of the workshop went well in addition to some of the challenges. After discussion, participants formed new groups to write a second memo.

For this session, participants were allowed to select and dictate their own topics. Three new groups were formed based on topics of interest. Each group was tasked with writing a one-page memo in 3 hours.

The groups had approximately thirty minutes for peer review to provide critiques and edits. Yvette Seger, Director of Science Policy for the Federation of American Societies for Experimental Biology (FASEB), then provided feedback. Similar to Ms. Vahlsing, she read the memos, then provided general tips and individual feedback on each memo. Participants felt that there was a significant improvement in the quality of memos from Day 1, which was reflected in Dr. Seger's adjudication.

III. Discussion

i. Workshop structure

In the following, we highlight several aspects of the workshop structure and detail their benefit. The most important and helpful aspect of the workshop was the critique of the memos by expert adjudicators. These experts have written and read many policy memos in their careers. The experts quickly reviewed each memo and then gave public critiques to all participants. In their critiques, they explained in detail the strengths and weaknesses of each memo, gave suggestions for improvements, and provided tips for the future. This was an enriching experience because the experts were able to provide explicit advice that one could not learn through a generic lecture.

A fundamental goal of the workshop was to provide novice participants with an "authentic" memo writing experience by giving them a broad topic they were not an expert on and providing them with minimal assistance. These components facilitated a real-life policy environment, as a new intern or staffer might experience. Participants were forced to dive straight into the challenge of writing a memo under time and page constraints. Since no one was an expert on any given topic, each participant was required to quickly research and write a cohesive memo on their topic. The time and page limits were crucial to the experience as they forced groups to (1) identify the specific goal of the memo and avoid getting distracted and lost in the details, and (2) work quickly and collaboratively. Due to the time limit, efficiency was vital to success. A recommended strategy was: 1) read individually for a time; 2) discuss as a group to develop a structure and strategy (have someone write while others discuss); then 3) divide tasks and work individually. If unsure of how to begin and due to limited prior knowledge, it may be useful to write first and clarify later.

A unique aspect of the workshop was that these memos were written in groups. In a typical memo situation, one individual composes a memo. Group work made the task less daunting and overwhelming by encouraging participants to split up the work and learn from one another. It showcased that effective teamwork is necessary to achieve success. Individuals must rely on their peers to check each other's work, especially in a new, high pressure situation.

Due to the imposed time constraint, the memos were written quickly and thus benefited greatly from peer review. At the end of each exercise, groups would exchange memos to help polish one another's memos before submitting for adjudication. Peer review was fundamentally a chance to test if the team communicated what they were intending to communicate in a concise and clear manner. It enabled the groups to present a more polished product to the expert adjudicators and provided an opportunity to learn from one's peers.

ii. Suggestions for future workshops

To the authors, a two-day workshop seemed like the appropriate amount of time, given the availability of participants, organizers, speakers, and resources. The premise of the first workshop helped everyone understand how to train scientists to write with a policy mindset. While sources and facts are important, the pivotal aspect is to develop a position, then argue it as well as possible.

One suggestion would be to have an expert go through the process of how to approach, research, and write a memo in real time. It would be

particularly helpful if they could suggest the resources they use to gather facts and what information they choose to include, also and discuss what details would be crucial to the argument. It would also be helpful to have presenters briefly discuss the typical content and style of a memo.

iii. Considerations for workshops hosted outside of Washington D.C. and remotely
The authors recognize that many groups will likely encounter difficulties finding local experts in science policy and policy writing. We expect that future workshops will vary from our structure or be held remotely via video conference. It is increasingly common for speakers to participate via video conference platforms such as Zoom and Google Meeting, which provide versatile work platforms.

For groups looking for experts to participate in the training:

- If affiliated with a university, we recommend checking if they have a Government Relations Office, and whether they can recommend anyone to review the workshop policy memos.
- Many scientific societies (in particular AAAS, Society for Neuroscience, the American Geophysical Union, and the Federation of American Societies for Experimental Biology) have legislative affairs and science policy experts on staff and will likely be of help.
- The National Science Policy Network is a resource for recommended remote speakers.

IV. Key takeaways from the workshop

i. Identifying the purpose and directly addressing your audience
Before beginning the memo, it is important to identify the reason for writing the memo and the intended audience. A person may write a policy memo driven by different motivations (e.g., an analysis of a particular policy, advocacy, etc.). What is being accomplished with this memo? Without a definitive answer to the purpose, it will be difficult to proceed. Provide the audience with the appropriate advice pertaining to the purpose: a

decision, a new project, a policy stance to take. Is the audience seeking advice or researching a new topic?

Knowing your audience is one of the most critical aspects of defining your purpose. The message of the memo must be framed to make the issue important to the reader and appealing to their interests, values, and concerns. For example, suppose a staffer is asked to write a memo asking for three ways to improve the patenting process at the U.S. Patent and Trademarks Office. If the memo is written to a Congressional Representative who is unfamiliar with the patent process, the memo must be written in a way to grab the Representative's attention, providing details of why the patenting process is important as well as what issues plague the process. Furthermore, additional background information about the patenting process may be included.

In contrast, if the staffer is writing a memo to a Senator critical of the patenting process, background information may be omitted as the audience is already knowledgeable. Likewise, this memo may place more emphasis on statistics or talking points that highlight the problems with the process.

ii. Structure of a memo
While memos can vary in length depending on purpose, these tips are for introducing a topic to a Congressperson with one or two pages. Every memorandum contains the same basic structure:

1. Header information (to, from, date, subject)
2. Introduction and purpose
3. Concise policy recommendation [could also come at the end in more detail]
4. Background and context
5. Policy options
6. Advantages and disadvantages or limitations and barriers, benefits and tradeoffs
7. Policy recommendation and reasoning

Formatting and style
Since many policy memos are often skimmed, rather than read in detail, careful consideration should be placed on the format and style. In general, memos should be easy to read with simple language, devoid of jargon and excessive verbiage. The document should have a logical narrative, with the most important information towards the top using the concept of "bottom line up front" (BLUF).

Careful formatting makes the document easier to skim and locate important information, which helps to convey the key concepts. The use of section headers, indentation, and bullet points organize the document while italicization, bolding, and underlining can be used to place emphasis on important pieces of information.

Header of a memo
The header section of the memo should clearly include to whom the memo is addressed, from whom the memo is sent, the date, and a short subject that summarizes the purpose of a memo. An optional one-line summary of the memo or statement of purpose could be included in this section. Clearly stating this information helps to establish the context for the remainder of the memo.

Introduction section
The introduction provides context of why this memo was written. For example, "Senator X asked me to write this memo so that he/she can understand what stance to take regarding Y" or "The chairman inquired about policy options regarding broadband in rural areas."

The next line is a quick summary and states the policy recommendation: "I explored these options XYZ and chose X for these reasons." The policy recommendation takes a succinct position on the issue, something memorable that the Congressperson can remember and recall.

However, since this is the section that a reader often looks at first and is likely to read most carefully, a summary of the conclusions and/or recommendations should be placed here. This allows the reader to easily access the most important information in the memo.

As discussed, each memo is written with a purpose: is this a policy stance or a new project for the Congressperson to take? Clearly define the issue. For example, the Congressperson could ask a legislative assistant to identify what stance to take regarding a new bill or a hot issue. Who are the stakeholders?

Supporting sections - background
The remaining sections of the memo should be used to support the conclusions stated in the introduction.

Depending on the purpose of the memo and the nature of the topic, certain items may be important to address. These items can include the following:

- Current policies or laws (legislative history/timeline)
- The U.S. government's position
- Advantages and disadvantages of a policy
- Challenges or criticism
- Stakeholders and the impact on them (constituents)
- Media portrayal and/or public opinion

Provide any necessary context needed to understand the issue and the purpose of the memo. Use the "killer" statistics in the background. Frame the problem with: "Americans spend $$ on x..." or "Increase the number of students by 10%." Good statistics will grab the policymakers' attention. For example, use phrasing such as "for every $1 you spend, you see a $8 increase..." or "for 100-fold increase in economic gain..."

Policy options
Kumar Garg, one of the workshop lecturers, stated that policy memos devoid of policy options are no different than an op-ed. Most memos typically include three options, which provides enough options without adding confusion. It is important to remember that all options presented do not necessarily need to be equally weighted. Furthermore, the status quo can often be an option.

Typically, three options are provided with a brief description, in which the advantages and disadvantages are discussed, outlining the benefits and tradeoffs. Who benefits and who does not? What are the short and long-term implications? Use supporting evidence from your research. Identify whom this policy option affects. What are some limitations or barriers to this option?

Recommendations
It is typical for a memo to begin or end with a recommendation section, which provides guidance on what action should be taken. The choice to include this at the beginning or the end is stylistic, but this section must be included. The section summarizes the impacts of the options and addresses the effects on stakeholders.

This section can also be used to address the following points:

- What is needed to implement policy?
- Why is your policy recommendation the RIGHT one?
- How does the recommendation move you towards success?

Appendix [optional]
Given the concise nature of a policy memo, only the most pertinent information should be included in the main text of the document. A common approach is to first deliver a short one-or-two-page memo, and then a longer, more in-depth memo is written if further clarification is needed. However, if there are pieces of supporting information that might be useful for the reader but not necessarily critical, that information can be included in an appendix or a backup information during a meeting to discuss the memo. The appendices could include any graphics or numbers. The appendix, much like the rest of the document, should be neatly organized and easy to skim.

iii. Writing tips specifically geared towards scientists

Bottom line up front
One major difference between science writing and memo writing is the overall structure. Traditional science writing typically starts with background information in the beginning, ends with the results, and uses the supporting information to link the two sections together. Memo writing puts the most important conclusions at the top with the following sections providing context and supporting information.

Sourcing and citing information
The pace of science is much slower than policy. While the tendency in science is to wait until all the data are collected and analyzed, there is seldom enough time to do a comprehensive analysis of all the data for a memo. Thus, it is important for memo writers to be comfortable proceeding confidently with only 60-70% of information while still making a strong recommendation.

Furthermore, unlike a manuscript for publication in a scientific journal, policy memos seldom include references. This is because the reader trusts the writer to have done adequate background research prior to writing and that the information presented in the memo is accurate and reliable. Thus, for memo writing, scientists need to be comfortable omitting references.

Style choices
1. Use of fonts, indents, structure
2. 1-2 pages
3. Use of bolding, underlining bullets, sectioning
4. Paragraphs should be single-spaced
5. Use succinct, easy to understand language
6. Word choice, conciseness
7. Simple language: minimize the number of adverbs and "fluff." Transition statements should be avoided.

V. Conclusion
NSPN's two-day memo writing workshop was considered a success by both organizers and participants. This professional development activity exposed participants to the memo writing process in a fun and collaborative setting. Furthermore, each person was able to take their newly gained knowledge and share it with the members of their respective science policy groups.

We hope that the success of this workshop and the contents of this workshop review will encourage more organizations to undertake similar projects. Furthermore, we hope that potential sponsors see value in such projects and will help organizations such as NSPN facilitate similar workshops in the future.

Supplementary material

I. Policy memo resources
- Leadership for Educational Equity: Guide to Writing an Effective Policy Memo
- Duke University Thompson Writing program: Guidelines for Policy Memos
- Harvard Kennedy School Communications Program: How to Write a Policy Memo
- Recordings of workshop lectures and memo reviews.
- Press release for NSPN memo competition

II. Personal reflections from participants in the NSPN workshop

We asked participants to share reflections from their experiences in the workshop to aid in determining what was done well and would need improvement for a future workshop. These reflections are shared below (lightly edited):

Emily Moravec

First, I would like to note that as a scientist, it can be particularly jarring and daunting to write on a topic that you know nothing about in a timed situation. But through this workshop and its structure, I learned that sometimes you have to take the plunge even with no idea of what one is plunging into. I learned to rely on my colleagues in situations such as this, which I believe is an important aspect of policy. In policy, you will often be working on topics that you do not have expertise in, and you have to turn to colleagues and the community at large for answers.

Second, before jumping in and writing a memo, it would have been helpful to, as a group, go through an example memo that an expert had written (whether with the expert themselves or just as a group) to explicitly see and absorb the structure of memo writing. I believe that this would have helped immensely reduce the panic and simply provide more structure for novice participants.

Lastly, I appreciated that the workshop was organized over a weekend -- one day during the week and one day on the weekend for practicality of missing work.

Grant S. Hisao

The structure of how the prompts were selected resulted in two different styles of policy memos. The specific prompts used in Day 1 constrained groups to focus on addressing the specificity of the prompt. By nature of the prompts used, each memo was written in a way that would provide neutral options, similar to a staffer writing a memo that provides options to an elected official or department head. By contrast, the structure of Day 2 allowed groups more freedom in writing their memos. As a result, each memo was written with a tone of advocacy from the perspective of an advocacy group addressing a governmental entity.

Though the main point of both exercises was to write a policy memo on a scientific topic and practice the skills necessary for doing so, the techniques employed were slightly different. The method used in Day 1 required participants to really dissect the meaning of the prompt and to address each aspect of the prompt. On the contrary, less constraints on Day 2 allowed groups more flexibility and may have ultimately made this exercise easier.

Fortunately, the two individuals selected to review the memos fit the style of the memos. Candace Vahlsing, a staffer in a Senator's office, was an exceptional adjudicator of the intragovernmental style of memos written in Day 1, while Yvette Seger, the policy director at FASEB, was a perfect match for the advocacy type of memos of Day 2.

Lily T. Nguyen

The teamwork aspect of the weekend was vital to the success of the workshop. While a writer would be writing individually in a realistic situation, it was not feasible in this workshop setting given the time constraints and the lack of knowledge. We were able to split up researching tasks and work together to develop the content of the memos. We were given some example memos, so we decided to model our memos after them.

My other big takeaway from the weekend is the mindset shift that scientists have to take. It was interesting to see the different strategies that other trained scientists use and the contrast between policy memo writing and the thoroughness and straight facts required of academic research. Scientists do not like to take positions that they do

not feel 100% confident in, which could be a huge barrier in this kind of environment. Given the fast-paced environment of Congressional policy, it is imperative to work quickly and effectively and develop a position, even if all the necessary background has not been researched. Scientists can also benefit from learning how to write more succinctly and with an active voice.

Robert Stanley

Overall the memo writing workshop was a success. The opportunity to learn and network with people was quite useful. However, in the future, given that the purpose was to teach us how to teach people to write memos, I would appreciate a couple tweaks. First, I noted that a number of people deleted practice memos from the shared accounts along with the notes attached, and these should be placed into an easily accessible folder. Second, although we were short on time, it would be a useful exercise to form small groups and for 5 minutes or so, practice telling people what is important about memo writing, to provide a forum to see how much has really been synthesized and what aspects were important to each person. The more resources and practice instructing that we have, the more that we can share with our constitutive groups.

The more work and preparation that can be done on the front side, the easier it is for organizers to lead local workshops, and the more value they can give to their members. Overall, this workshop was very successful.

III. Audio and video recommendations for similar workshops

While the workshop alone provided a unique training environment to attending individuals, it also presented an opportunity to generate recorded resources for members nationwide (see Resource link above). To produce these resources, a suite of recording and editing equipment was used:

i. Audio

The audio quality is arguably the most critical part of educational material recording: little can be done to correct inaudible voices. Since there was only one opportunity to record each speaker, two recording setups were used simultaneously to assure no technical glitches and to minimize loss of content.

Primary recording source

Lavalier microphone (Rode Smart Lav+) connected to computer via 3.5 mm jack-to-usb converter. This was due to hardware limitations that prevented recording while plugged into computer microphone jack. Recorded on *Audacity*. A Lavalier microphone is a good quality choice that enables clear recordings of single individuals. Caution should be taken to have the microphone clipped approximately 6 inches (15 cm) from the mouth and that the microphone is pointing upwards. A Lavalier microphone is a not good for interviews or multiple voice recordings, unless all microphones are channeled through a single mixer.

Secondary recording source (backup)

Blue Yeti Pro connected to computer via USB port. Recorded on *Audacity*. The Blue Yeti is a common choice for podcast recordings, capable of high-quality recordings of single individuals, and medium level quality recordings of multiple voices sitting around the microphone. While none of the Blue Yeti recordings were used (due to successful Lavalier microphone recordings), it provided a reasonable quality backup.

ii. Video

Video recordings were also taken. Unfortunately, the camera was outdated and produced recordings that required conversion, complicating the editing process. Having a backup portable hard drive is a must, as high-resolution recordings yield file sizes of dozens of gigabytes.

iii. Editing

To combine the different audio and video tracks, as well as edit the videos into a final product, two separate software packages were utilized. While this could be done with a wide variety of different products, our choices provided reasonable options despite being freeware products.

Any Video Converter used to convert video recordings to compatible format usable by editing software. Essential for ensuring that all video sources are both in the same format, as well as the same frame rate (fps). For our recordings, we converted all videos to 30 fps.

The freeware version of the *Lightworks Editor* is a robust editing platform (with a medium level

learning curve) that can export videos at medium resolution. This proved perfect for generating medium sized videos for YouTube. Image overlay, special effects, and cropping can all be done with the software which was used for all our videos. There is sufficient use of this software such that many questions can be answered by searching online.

IV. Workshop organizers, lecturers, memo adjudicators, and participants
Listed below are the names and affiliations (at time of event) of the individuals associated with this workshop.

Workshop Organizers
- Victoria Schneider (Rockefeller University; Science and Education Policy Association)
- Avital Percher (National Science Policy Network)
- Danielle DaCrema (University of Virginia; Science Policy Initiative at the University of Virginia)
- Javier Menendez (Skirball Institute, NYU School of Medicine; Science Education and Policy Association)

Lecturers
- Kumar Garg (Senior Director for Technology and Society at the Schmidt Futures Foundation)
- Shalin Jyotishi (Associate in Economic Development & Community Engagement at the Association of Public and Land-grant Universities; CEO of the Journal of Science Policy & Governance)
- Erin Heath (Associate Director of Government Relations at the American Association for the Advancement of Science)

Memo Adjudicators
- Candace Vahlsing (Senior Advisor for Energy, Climate, and Environment for Sen. Michael Bennet)
- Yvette Seger (Deputy Director in the Office of Public Affairs and Director of Science Policy at the Federation of American Societies for Experimental Biology)

Emily Moravec will finish her PhD in astronomy in December 2019 at the University of Florida then begin a postdoctoral position at the Astronomical Institute of the Czech Academy of Sciences in January 2020. From January - April 2018, Emily was a Christine Mirzayan Science & Technology Policy Fellow at the National Academies of Sciences, Engineering, and Medicine. When she returned to the University of Florida after her time at the Academies, Emily co-founded Emerging Leaders in Science Policy and Advocacy at the University of Florida fall 2018 and has been integrally involved in the work of this group ever since.

Avital Percher is a AAAS Science and Technology Policy Fellow, and Director of Partnerships for the National Science Policy Network.

Lily Nguyen is currently working as a senior consultant. She completed her PhD in Materials Science and Engineering from Carnegie Mellon University in 2015.