

University of Nebraska - Lincoln  
**DigitalCommons@University of Nebraska - Lincoln**

---

Faculty Publications, UNL Libraries

Libraries at University of Nebraska-Lincoln

---

2017

# Where Science Intersects Pop Culture: An Informal Science Education Outreach Program

Raychelle Burks

*St. Edwards University*, [rburks@stedwards.edu](mailto:rburks@stedwards.edu)

Kiyomi D. Deards

*University of Nebraska-Lincoln*, [kdeards2@unl.edu](mailto:kdeards2@unl.edu)

Erica DeFrain

*University of Nebraska-Lincoln*, [edefrain2@unl.edu](mailto:edefrain2@unl.edu)

Follow this and additional works at: <https://digitalcommons.unl.edu/librarianscience>



Part of the [Educational Methods Commons](#), [Higher Education Commons](#), [Information Literacy Commons](#), and the [Science and Mathematics Education Commons](#)

---

Burks, Raychelle; Deards, Kiyomi D.; and DeFrain, Erica, "Where Science Intersects Pop Culture: An Informal Science Education Outreach Program" (2017). *Faculty Publications, UNL Libraries*. 383.

<https://digitalcommons.unl.edu/librarianscience/383>

This Article is brought to you for free and open access by the Libraries at University of Nebraska-Lincoln at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Faculty Publications, UNL Libraries by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

## Where Science Intersects Pop Culture: An Informal Science Education Outreach Program

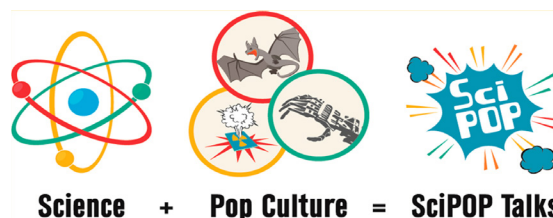
Raychelle Burks\*, Kiyomi D. Deards, and Erica DeFrain

RB: Department of Chemistry, St. Edward's University, Austin, Texas, United States

KDD and ED: Research and Instructional Services Department, Love Library,  
University of Nebraska–Lincoln, Lincoln, Nebraska, United States

### ABSTRACT

Attracting a general audience to STEM topics can be a challenge, and developing engaging and interactive instruction is important for educators in all fields. While many chemical educators have successfully used pop-culture themes to introduce their students to scientific concepts, these encounters are largely limited to formal classroom environments. Inspired by the successes of community science programs such as Science Café and Nerd Nite, science educators from two Nebraska campuses sought to broaden the exposure of their pop-culture themed class lectures, and created the SciPop Talks! program. Now entering its fifth year, this informal educational outreach program has become a model of faculty/librarian partnerships and successful campus outreach. In this article, we discuss the program's formation, outline its strengths and challenges, and stress the importance of using interactivity to engage with learners. We report on findings from a survey of our attendees, which revealed surprising differences along gender lines. By sharing the motivations, strategies, operational specifics, outcomes, and future goals, we hope that scientists, science educators, outreach coordinators, and librarians will be inspired to launch their own SciPop Talks! programs.



Enticing a general audience, especially a general undergraduate audience, to STEM outreach and programming activities is challenging, but necessary to increase public understanding and trust in science. Lack of interest, limited funds, and inadequate support are just a few of the hurdles facing educators developing new programs. In 2013, University of Nebraska-Lincoln chemistry (UNL Chem) professor Rebecca Lai, UNL science librarian Kiyomi Deards, and Raychelle Burks, at the time a postdoctoral researcher in chemistry at Doane College, discovered a shared interest in science communication when they met at a conference. Inspired by the informal and accessible Science Café and Nerd Nite events taking place around the globe, they recognized the importance of connecting scientists and scientific topics with diverse audiences.<sup>1</sup> Moved by their own love of science fiction and fantasy, they felt this could best be accomplished by melding science education, active learning, and popular culture in an informal educational setting.<sup>2,3</sup>

UNL professor Mark Griep's book *ReAction! Chemistry in the Movies*, which emphasizes drawing people into science through entertainment, demonstrated the great potential they saw in using popular culture as a main bridge to their program.<sup>4</sup> Lai had

received national recognition and numerous teaching awards from her popular undergraduate CHEM 192H course, *A Muggle's Guide to Harry Potter's Chemistry*.<sup>5</sup> Similarly, Burks' work as a science communicator and with GeekGirlCon's DIY Science Zone convinced her of the power of using pop culture to attract women and girls to the sciences.<sup>6</sup> After brainstorming a short list of potential speakers, Deards was able to secure a central location at the main campus library, and in 2014, SciPop Talks! was born.

In this article, we discuss the strengths and challenges of coordinating the SciPop Talks! informal education outreach program, and assert the importance of using interactivity to engage with learners. To better understand not only who was coming to these events, but also get some insight as to why, we also report on findings from a survey of our Spring 2015 attendees, which revealed surprising differences along gender lines. Our program has grown over the years with approximately 2400 people attending one of our SciPop Talks!, and its spin-off, SciPop Interactive, events in Spring 2017. By sharing the motivations, strategies, operational specifics, outcomes, and future goals, we hope that scientists, science educators, outreach coordinators, and librarians will be inspired to launch SciPop Talks! at their own campuses.

### KEYWORDS

General public, First-year undergraduate/General, second-year undergraduate, Upper-division undergraduate, Interdisciplinary/Multidisciplinary, Public understanding/Outreach, Multimedia-based learning, Applications of chemistry, Learning theories

### AUTHOR INFORMATION

E-mail addresses: rburks@stedwards.edu; kdeards2@unl.edu; edefrain2@unl.edu; \*corresponding author  
ORCIDs: Burks 0000-0003-4696-609X; Deards 0000-0001-6381-9927; DeFrain 0000-0002-5088-4866

## POP CULTURE, ACTIVE LEARNING, AND CHEMICAL EDUCATION

Using popular culture themes to teach scientific concepts is a well-known pedagogic strategy. As Kerby et al. stated (p. 24 of ref. 7), “A science outreach show cannot teach unless it can capture and hold the attention of the audience. To be effective, it must also be entertaining.” From the beginning, a primary goal of the SciPop Talks! program has been to use pop-culture themes to broaden the appeal of scientific topics. There are numerous examples of chemistry educators successfully using this as a curricular strategy: Hollis, Goll and Wood, and Griep all used popular movies to engage their students and present scientific topics.<sup>8-10</sup> Frey, Mikasen, and Griep created a set of criteria for using film to teach chemistry, stating that (p. 118 of ref. 11)

...clips with popular actors, incredible sets, memorable dialogue, and special chemical effects would be the most useful for instruction because they would have the strongest anchoring capacity.

According to the authors, anchoring, or contextualizing difficult content with concepts students are already familiar with, assists with lessening students’ cognitive load, enabling them to transform the content into knowledge.<sup>11</sup> Similarly, in a study by Griep and Reimer, they found that the documentary *An Inconvenient Truth* was an enjoyable, jargon-free, and nonintimidating way to ease students into learning about global warming.<sup>12</sup>

While pop culture can be successful at gaining an attendee’s attention, an added obstacle for science educators is to first gain an audience receptive to learning. Small, public conversations about science and philosophy were a well-documented part of 19th century European life.<sup>13</sup> After going dormant for over a century, the “café movement” was resurrected in 1998 by a British science journalist, and the concept quickly spread to more than 130 independent programs around the world.<sup>13</sup>

These free, informal forums, often advertised as Science Cafés or Nerd Nites, are deliberately held at public spaces such as coffee shops, bars, and restaurants, and have been successful at attracting the general public to engage with scientists about complex subject matter.<sup>2,3,13</sup> This informal engagement seems to be a key component of these forums’ success: Navid and Einsiedel surveyed attendees of five synthetic biology Science Cafés and found the forum to be successful at promoting public engagement.<sup>14</sup> They were impressed with the audience’s high level of interest with the topic and willingness to share their perspectives, and the authors largely attributed the success to their informal and accessible nature, which they deemed “key to effective knowledge-transition” (ref. 14, p. 7).

While a program’s topic plays a crucial role in enticing participants to attend, another key characteristic of SciPop Talks! is the use of active learning techniques, such as voting on correct answers and asking open ended questions, to engage the audience through interaction. Active learning has been a popular teaching method for decades, gaining mainstream appeal in the 1990s, due in large part to Bonwell and Eison’s Association for the Study of Higher Education report.<sup>15</sup> Among chemistry educators, active learning has been repeatedly demonstrated to engage students and improve success rates.<sup>16-18</sup> For example, despite over 20 years of experience in chemical education, Paulson’s concern with high attrition rates and poor comprehension encouraged him to rethink his instruction strategies.<sup>19</sup> By emphasizing group learning activities

and introducing simple active learning techniques such as “minute papers” and class discussions, Paulson found evidence that students were more engaged, better able to apply the principles of organic chemistry, and greatly increased the retention rate.<sup>19</sup> In another study, MacArthur and Jones reviewed 56 publications on the use of clickers in college-level science classrooms.<sup>20</sup> The authors concluded that clickers, which allow students to respond to instructor-led questions via a hand-held device, offer numerous practical benefits to science teachers, were linked to increased student attitudes, and improved learning thanks to the facilitation of using more formative learning assessments, and greater opportunity for student collaboration.<sup>20</sup>

### Developing SciPop Talks! Program Evolution and Building Campus Connections

In 2014, an alignment of schedules gave Burks, Deards, and Lai the time they needed to develop the SciPop Talks! series. They were optimistic about the program’s success and sought to create a sustainable framework. The Science Café model in which members of the public engage informally with scientists in coffee houses and other casual settings was appealing.<sup>2</sup> However, the group wanted to target college students, and recognized the tremendous benefits associated with hosting the program on campus. The group identified the library as being the best place to host the events. Practically speaking, its central location made it easily accessible; it was open in the evenings, and had space to accommodate audiences of up to 100 people.

Strategically, the library is a neutral space inhabited by researchers and students from all disciplines. Physically locating the program within the science department could be intimidating and act as a deterrent to a nonscience oriented attendee. Additionally, they assumed that a program featuring entertaining topics and free food would attract students in desperate need of a break from their studies.

After receiving permission to center the program at UNL Libraries, the group began identifying possible presenters. They limited their search to UNL and Doane College faculty who were already using pop-culture themes in their curriculum. A presenter’s only requirement was to include at least two instances of interaction between themselves and the audience.

Examples of interactions have included the following: open ended questions for discussion, voting on the answer to a scientific question or explanation, and demonstrations requiring audience participation. On February 26, 2014, SciPop Talks! debuted with “The Story of Chocolate: Nutrition and Sensory Qualities,” featuring Dr. Marilyn Schnepf, who supplemented her presentation with chocolate samples from around the world. Organizers were thrilled when nearly 70 people showed up to the first program, well beyond their initial estimate of drawing around 20 attendees. That spring, seven additional presenters covered such diverse topics as “Chemistry to Survive the Zombie Apocalypse,” “Interview with a Vampire: Decoded by Scientists,” and “Alien Biochemistry in the Movies.” In fall 2014, they invited people to come dressed in costumes as Lai and Burks passionately debated the merits of vampires versus zombies to celebrate Halloween.

In the second year of the program, faculty were invited from a larger number of departments as well as the University of Nebraska at Omaha. Program organizers decided that guidelines would help standardize and streamline the event.<sup>21</sup> The guidelines cover useful topics including the following: slide creation tips, examples of

interactive activities, and best practices for interacting with the media.<sup>21,22</sup> Feedback from presenters indicated that the guidelines are very useful. Several of them indicated that they had not previously attempted to use active learning techniques in informal presentations and found the experience enjoyable.

For the second spring season, seven programs were held, including the Game of Thrones themed “A Song of Ice, Fire, and Chemistry,” “The Radioactive Origins of Marvel Comics,” and the thrilling “Fire & Explosions in Hollywood Films.” Titles and speaker information for the 2014 and 2015 SciPop Talks! series are listed in Boxes 1 and 2.

#### Box 1. 2014 Spring SciPop Talks! Speakers

*The Story of Chocolate: Nutrition and Sensory Qualities*, Marilyn Schnepf, UNL Department of Food Science & Technology  
*Chemistry To Survive the Zombie Apocalypse*, Raychelle Burks, Doane College Department of Chemistry  
*Alien Biochemistry in the Movies*, Mark Griep, UNL Department of Chemistry  
*Making “Inception” Real*, Ramesh Laungani, Doane College Department of Chemistry  
*Forensics Science: Fact of Fiction*, Ashley Hall, UNL Department of Biochemistry  
*Book 8: Harry Potter & the Magic of Science*, Rebecca Lai, UNL Department of Chemistry  
*Game Theory and Breaking Bad*, Kristopher Williams, Doane College Department of Mathematics  
*Interview with the Vampire – Decoded by Scientists*, Rebecca Lai, Department of Chemistry

#### Box 2. Fall 2014 and Spring 2015 Talks and Speakers

*Vampires vs. Zombies: A Battle of the Undead*, Rebecca Lai, UNL Department of Chemistry and Raychelle Burks, Doane, Department of Chemistry  
*The Art & Science of Fermented Foods*, Robert Hutkins, UNL Department of Food Science and Technology  
*Innovations in Textiles: From Garbage to Fashion*, Yiqi Yang, UNL Department of Textiles, Merchandising & Fashion Design  
*The Radioactive Origins of Marvel Comics*, Daniel Claes, UNL Department of Physics & Astronomy  
*Fire & Explosions in Hollywood Films*, Brad D. Elders, Doane Department of Biology  
*Biomechanics Technology: From Pop Culture to Rehabilitation*, Sara A. Myers, UNO Department of Health, Physical Education, and Recreation  
*March Madness*, Jeff Griesch, UNL Athletics  
*A Song of Ice & Fire & Chemistry*, Raychelle Burks, Doane College Department of Chemistry

#### Outreach and Marketing

UNL Community Engagement Librarian, Joan Barnes, coordinates all press releases, marketing materials, and social media, including live tweeting for each event. Each release includes an overview of the talks, the Twitter hashtag #scipoptalks, and the information that the talks are free and open to the general public. They also acknowledge the sponsors and provide a link to the Web site. Barnes’ Social Media Events Public Relations Form<sup>23</sup> facilitates the use of student workers to push out press releases and publicity materials.

Three elements are used to create a cohesive style for the series: (a) the title of the series (see above), (b) fun presentation titles

bridging the gap between science with pop culture, and (c) cohesive graphics. Titles for talks are deliberately crafted to be fun and appeal to a general audience, not just science and science fiction and fantasy fans. Barnes, who does not have a background in science, and her student assistants help to review the titles to ensure their clarity and appeal to nonscience enthusiasts. This process has resulted in consistently engaging titles such as “The Art & Science of Fermented Foods,” and “The Radioactive Origins of Marvel Comics.”

Graphics sharing similar visual elements to tie the series together have been an important component of the marketing plan. A strong, colorful, and engaging image was designed in Fall 2014 that is used on all related event promotions and outputs (see Figure 1). The image is colorful (blue, yellow, red, black, and white) and conveys explosive motion. It was purposely designed to be institutionally blind allowing for any campus or organization to host their own SciPop event.



Figure 1. SciPop Talks! graphical representation. (Image created by Erin Colonna, reprinted with permission from UNL Libraries.)

Elements referenced in the presentations are incorporated into related word art images including the following: dragons, swords, clothes, biomechanical arms, and fires (see Figures 2 and 3).

The following press release text was written by Joan Barnes, UNL Libraries:

Bring a friend and come in costume for a special Halloween edition of #SciPopTalk on October 29, 2014, at 7 pm in Love Library, Talk Zone (Rm 222). Rebecca Lai and Raychelle Burks, from last semester, will return and face head to head in debate over zombies vs. vampires.

Popcorn and other refreshments will be available, prizes will be given out for best costumes AND we will also be announcing the spring lineup of #SciPopTalks!

So which team are you? #TeamZomB or #TeamVamp?

#### Connecting SciPop Talks! to Library Collections

A fundamental part of SciPop Talks! is explicitly connecting science to popular culture topics, which we do through topic selection and multimedia materials provided by the UNL Libraries. Examples include the following: AMC’s *The Walking Dead*, NCAA *March Madness*, and Marvel’s *Fantastic Four* comic book series. Thematic multimedia displays works featuring both popular and scholarly are designed and prepared by UNL Libraries in collaboration with with speakers for integration into the presentation space. These silent yet dynamic displays accompany the talks and encourage further exploration on each topic. While only a small number of items (five or less) may be checked out on any given night, several attendees have stated that they found new resources to use at a later date. Increased use of materials in the Popular Science collection and Graphic Novels collection indicates a better awareness of these materials.

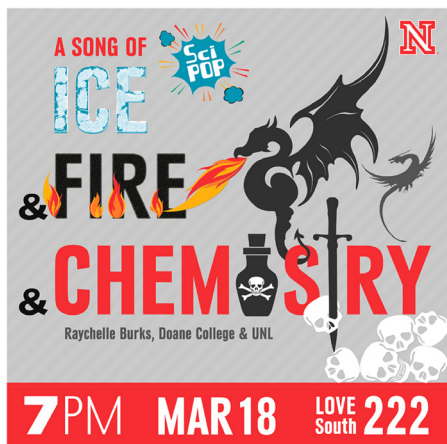


Figure 2. SciPop Talks! A Song of Ice & Fire & Chemistry publicity image using ice, fire, a bottle of poison, a sword, and dragons to enhance and create the letters of the titles of the talk. (Image created by Erin Colonna, reprinted with permission from UNL Libraries.)

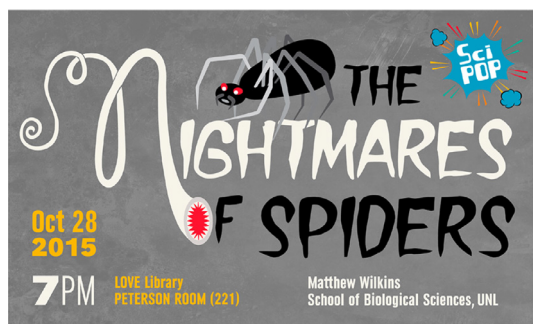


Figure 3. SciPop Talks! The Nightmares of Spiders publicity image using a spider and artistic depiction of a parasite. (Image created by Erin Colonna, reprinted with permission from UNL Libraries.)

Materials are also listed on the Web site, <http://unl.libguides.com/scipoptalks>.<sup>24</sup> Due to input from student employees, links to news articles, online videos, and other multimedia items were added to SciPop web pages in 2015 to make them more engaging to nonscientists. Traffic on the SciPop Web site doubled from approximately 3000 unique views in 2014 to over 6100 in 2015 with twice those views projected for 2016. On the basis of feedback received in person, by email, and on Twitter, increased views of the Web site are coming from increased campus awareness and a growing national and international audience.

SciPop Talks! has been remarkably successful in garnering attention from a regional and national audience. We now sponsor an event with the Nebraska Local Section of the American Chemical Society, SciPop Interactive, as part of the Annual Nebraska Science Festival. A grant from the Camille and Henry Dreyfus Foundation Special Granting Program in the Chemical Sciences allowed us to partner with the American Chemical Society. We produced six popular short videos, now featured on their YouTube channel.

#### PROGRAM EVALUATION

We were pleased with the program's popularity, but interested in evaluating its success as an outreach program. To better understand why people were drawn to SciPop Talks!, and to test our assumptions about the appeal of using popular culture to present scientific concepts to nonscience audiences, we distributed a short, anonymous survey at the end of each of the seven SciPop Talks! presentations during the Spring 2015 semester. Each survey contained eight ques-

tions: five multiple choice questions collecting demographic data, two open ended questions aimed at evaluating what impact, if any, the presentation had on the participants, and one question asking what other questions they had for the speaker. Answers to the questions they had for the speaker were later posted on the appropriate talk web page. More information about the SciPop Talks! program, including past and future programs, the survey instrument, library resources, downloadable materials, videos, recommendations for hosting similar programs, and supplemental documents can be found at <http://unl.libguides.com/scipoptalks> (accessed June 2017).<sup>24</sup>

#### Response Rate

At the beginning of each presentation, we explained the purpose of the study, the IRB disclosure, and the information that returning the form (filled out or blank) would result in the ability to choose a small reward (flash drive, notepad, screen cleaner, reusable bag, sticky notes, or screen cleaner). Participants were informed that all responses would be anonymous and confidential, and that they could choose to withdraw their consent and discontinue participation at any time. Paper copies of the survey and the accompanying IRB disclosure form were predistributed by placing them on all of the seats. At the end of the presentation, we reminded attendees of the survey and again invited them to participate.

For analysis, survey responses from all of the SciPop Talks! events were grouped, as we were not focusing on comparing the different reasons for each of the topics but rather for the program as a whole. As this was a convenience sample from a relatively small population, we hoped to have a high a response rate. Of 153 total participants at the seven events, we received 115 completed surveys. Nebraska State Statute 43-2101 states that all persons under 19 years of age are declared to be minors; therefore, information from the six respondents aged 18 or under was discarded, leaving a final sample size of  $N = 109$ . This equates to a 71.2% response rate, which we believe is sufficient for the purposes of this exploratory study as it is above the recommended rate of 70.0%, and exceeds the reported average of 56.0% for paper-based surveys.<sup>25</sup>

#### Demographic Data

Of the 109 surveys collected, 55 (50.5%) of respondents were women, 47 (43.1%) men, and 7 (6.4%) chose not to report this information. A majority of respondents were white (83.4%), aged 19-24 (66.1%), and students (70.7%) (see Table 1 for additional demographic information).

#### Reasons for Attendance

The SciPop Talks! were created to appeal to a broader audience than those already intrinsically interested in STEM fields. To test that this was accomplished, we included a multiple choice question asking attendants "What brought you to SciPop Talks tonight?," allowing participants to choose all applicable reasons from the following: class credit, interest in science, interest in pop culture, group activity, walked by, and other (other allowed for a fill in the blank option). As a number of instructors offered class credit for student attendance, we assumed that this would account for the largest percentage of attendees, and this was fundamentally supported by the data gathered: of the 77 students in attendance, 53.2% attributed class credit for at least one of the reasons for coming.

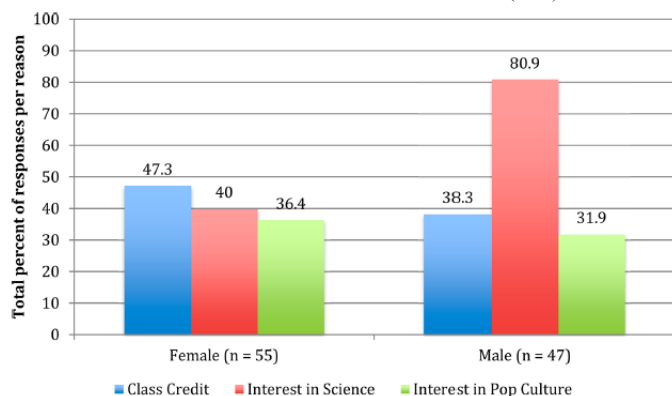
Findings from the long and still ongoing field of research into gender and interest in science overwhelmingly conclude that there is a strong gender bias in which men express greater interest in the topic than women.<sup>26-29</sup> Due to these findings, we anticipated detecting some differences between the genders in our survey, but predicted that these differences would be small given that participants

were from the university community, and not the general population. We were therefore surprised by the degree to which the responses varied when analyzed by gender. Of the 55 females who responded to “What brought you to SciPop Talks tonight?,” class credit was the most often cited reason for coming by nearly half (47.3%), with 40.0% attending due to an interest in science. Of the 47 male respondents, less than half (38.3%) attended due to class credit, whereas the large majority (80.9%) of males attended due to their interest in science (see Figure 4 for additional reasons for coming by gender).

We felt that these differences were striking enough to warrant further investigation. Using SPSS, a  $\chi^2$  test of independence was calculated comparing the frequency of reasons cited for attendance in men and women. We only analyzed this for participants who selected class credit, interest in science, or interest in pop culture. The other options were not selected by enough participants to adequately review their significance. No statistically significant differences were found between gender and class credit or interest in pop culture ( $\chi^2(1) = 0.83$ ,  $p = 0.362$ ;  $\chi^2(1) = 0.22$ ,  $p = 0.637$ ). However, a statistically significant interaction was found between gender and interest in science ( $\chi^2(1) = 17.46$ ,  $p < 0.001$ ). Additionally, the calculated Cramer’s V effect size of 0.41 suggests a moderately high effect, indicating that males were considerably more likely to attend due to an interest in science.

Table 1. Demographic Characteristics of Survey Respondents  
Characteristic (N = 109)

Characteristic	Gender	n (%)
	Female	55 (50.5)
	Male	47 (43.1)
	Do not want to share	7 (6.4)
	Ethnicity	
American Indian or Alaska Native		1 (0.9)
Asian		3 (2.8)
Black or African American		1 (0.9)
Native Hawaiian or other Pacific Islander		0 (0)
White		91 (83.4)
Hispanic or Latino		3 (2.8)
Do not want to share		10 (9.2)
	Affiliation	
UNL student		39 (35.8)
UNL faculty/staff		12 (11.0)
Doane student		38 (34.9)
Doane faculty/staff		0 (0)
Community member		14 (12.8)
Other		6 (5.5)
	Age	
19-24		72 (66.1)
25-35		20 (18.3)
36-50		6 (5.5)
50+		11 (10.1)



### What Was Most Interesting?

The survey also included the open ended question “What was most interesting about tonight’s talk?” Ninety-eight responses were given, many of which revealed enthusiasm for the event or demonstrated their recall of specific concepts explored during the interactive presentation:

Goat milk spider silk!

I did not know convection was so deadly!

Red wine is fermented with skin of grapes. White wine w/ skin off.

All the agricultural biproducts that fibers can be made of, and used to make products.

How dangerous a fire is and how fast you die from them.

Mostly the gas!

In addition to the comments about specific topics, a number of other types of comments were also received. Our curiosity about gender, initial reasons for attending, and the various things people found interesting led us to classify the comments into four unique categories: topic in general (17.3%) (e.g. “the biomedical applications”); specific topic (53.1%) (e.g. “the example of the grown ear,” and “skin graft”); complementary (16.3%) (e.g. “I had no idea. Absolutely fascinating. Thank you.”); and pop culture (13.3%) (“All the information I got about Game of Thrones”). We used SPSS to perform a  $\chi^2$  test of independence. No statistically significant differences were found ( $\chi^2(3) = 3.48$ ,  $p = 0.324$ ), and we performed no further analyses.

### DISCUSSION AND CONCLUSION

The results from our preliminary survey have surprised us in unanticipated ways. While the data have provided us with important information that will guide us as we move forward with program planning, we are compelled to reflect on the broader implications uncovered by the gender differences.

Increasing the number of women in STEM fields is certainly an important goal, and our hope is that programs like SciPop Talks!, which are welcoming, entertaining, and educational, can assist with this in some capacity. Although approximately half of the program’s attendees have been women, we are particularly concerned that our audience’s interest in science, mostly that of young adult undergraduate students, so closely mirrors the unfortunate gender dynamics found in other studies looking at attitudes toward science. Given that so many of the students were motivated to come due to class credit and were therefore ostensibly science students, we thought that their status would either decrease or nullify the gender division entirely. The overwhelming difference detected between our female and male participants in their interest in science deserves a closer look, and we are eager to bring this to the attention of our campus colleagues.

Moving forward, we are interested in exploring SciPop Talks! appeal with regard to more diverse audiences. In the fall of 2017, SciPop Talks! Hilltop will launch at St. Edward’s University, located in Austin, Texas. As with the Nebraska SciPop Talks!, this

Figure 4. Bar chart showing participant reasons for attending by gender. Participants were allowed to select all applicable reasons, accounting for multiple responses per individual.

program will be a collaboration between faculty and librarians, and be held at the main campus library.

As St. Edward's University is a small, federally designated Hispanic-serving, liberal arts institution, it will be interesting to compare that institution's program with UNL's. As the program expands, demographic data will become increasingly important to program evaluation of diversity and inclusion.

Finally, we are interested in continuing to evaluate SciPop Talks!, but with greater emphasis on understanding it as an educational tool. In our initial survey, we did not attempt to assess participant learning, whether through participant self-reflection or more formal assessment. Informal education events have played a pivotal role in promoting STEM fields, as well as encouraging and deepening science learning.<sup>30</sup> The National Science Teacher Association (NSTA) has officially recommended the expansion of informal learning opportunities, providing recommendations in their position statement Learning Science in Informal Environments.<sup>30</sup> We have developed the SciPop Talks! program in accordance with the NSTA recommendations on informal environments, informal science educators, and strengthening links between formal and informal science learning, but need to more formally evaluate its educational capacity.

In hindsight, we are pleased with all that we have been able to accomplish with SciPop Talks! and its spin-off SciPop Interactive. SciPop Interactive is an informal science outreach event combining science activities, make-and-take, and stage shows cosponsored by UNL, the Strategic Air Command and Aerospace Museum in Ashland, NE, and the Nebraska Local Section of the American Chemical Society. The program has helped us strengthen relationships throughout the community, increased awareness of the research interests and findings of numerous faculty and departments, and brought a sense of levity to our professional lives. We developed SciPop Talks! on a solid foundation of pedagogical best practices, allowing us to engage with a broad audience of learners who might not otherwise have considered how science impacts their everyday lives. Most importantly, these are simple strategies for other chemical educators to employ, and we hope others will feel encouraged to adopt our techniques and materials to launch a SciPop event at their own institution.

#### NOTES

The authors declare no competing financial interest.

#### ACKNOWLEDGMENTS

We would like to thank the UNL Chemistry and Physics Departments, UNL Libraries, and Doane College for their ongoing support of these talks and all the speakers whose enthusiastic participation has made this series a success. Joan Barnes and Erin Colonna, at UNL Libraries, are critical to the successful promotion of the series. We also thank the Camille & Henry Dreyfus Foundation and the American Chemical Society for their support and collaboration in the development of SciPop Reactions: This Is Chemistry.

#### REFERENCES

- Adams, J. How to start a science café: Science equals entertainment at many evening spots. *Scientist* (2004) 18: 50-52.
- Science Café's home page. Retrieved from <http://www.sciencecafes.org/> (accessed June 2017).
- Nerd Night home page. Retrieved from <https://nerdnite.com/> (accessed June 2017).
- Griep, M., and M. Mikasen. *ReAction! Chemistry in the Movies*. Oxford University Press: New York, 2009.
- Lai Lab home: The Lai lab. Retrieved from <http://chemweb.unl.edu/lai/> (accessed June 2017).
- DIY Science Zone Donations. Geek Girl Con. Retrieved from <http://geek-girlcon.com/diy-science-zone-donations/> (accessed June 2017).
- Kerby, H., J. Cantor, M. Weiland, C. Babiarz, and A. Kerby. Fusion science theater presents the amazing chemical circus: A new model of outreach that uses theater to engage children in learning. *Journal of Chemical Education* (2010) 87(10): 1024-1030.
- Hollis, W. G., Jr. Jurassic Park as a teaching tool in the chemistry classroom. *Journal of Chemical Education* (1996) 73(1): 61.
- Goll, J. G., and B. J. Woods. Teaching chemistry using the movie Apollo 13. *Journal of Chemical Education* (1999) 76(4): 506-508.
- Griep, M. A., and M. L. Mikasen. Based on a true story: Using movies as source material for general chemistry reports. *Journal of Chemical Education* (2005) 82(10): 1501-1503.
- Frey, C. A., M. L. Mikasen, and M. A. Griep. Put some movie wow! in your chemistry teaching. *Journal of Chemical Education* (2012) 89(9): 1138-1143.
- Griep, M. A., and K. Reimer. An inconvenient truth: Is it still effective at familiarizing students with global warming? *Journal of Chemical Education* (2016) 93(11): 1886-1893.
- Dallas, D. Café Scientifique. *Nature* (1999) 399: 120.
- Navid, E. L., and E. F. Einsiedel. Synthetic biology in the ScienceCafé: What have we learned about public engagement? *Journal of Science Communication* (2012) 11(4): 1-9. Retrieved from [https://jcom.sissa.it/sites/default/files/documents/Jcom1104\(2012\)A02.pdf](https://jcom.sissa.it/sites/default/files/documents/Jcom1104(2012)A02.pdf) (accessed June 2017).
- Bonwell, C. C., and J. A. Eison. Active learning: Creating excitement in the classroom. ASHE-ERIC Higher Education Report No. 1. George Washington University, School of Education and Human Development: Washington, DC (1991). Retrieved from <http://files.eric.ed.gov/fulltext/ED336049.pdf> (accessed June 2017).
- Bowen, C. W. A Quantitative literature review of cooperative learning effects on high school and college chemistry achievement. *Journal of Chemical Education* (2000) 77(1): 116-119.
- Hinde, R. J., and J. Kovac. Student active learning methods in physical chemistry. *Journal of Chemical Education* (2001) 78(1): 93.
- Kovac, J. Student active learning methods in general chemistry. *Journal of Chemical Education* (1999) 76(1): 120-124.
- Paulson, D. R. Active learning and cooperative learning in the organic chemistry lecture class. *Journal of Chemical Education* (1999) 76(8): 1136.
- MacArthur, J. R., and L. L. Jones. A review of literature reports of clickers applicable to college chemistry classrooms. *Chemistry Education Research and Practice* (2008) 9: 187-195.
- Deards, K. D., and R. Burks. Sci Pop Talks! presenter guidelines (2015). Retrieved from <http://digitalcommons.unl.edu/libraryscience/336> (accessed June 2017).
- American Association for the Advancement of Science. Communication tool kit (2017). Retrieved from <https://www.aaas.org/page/tv-andradio-media-tips> (accessed June 2017).
- Barnes, J. Social media events public relations form (2016). Retrieved from <http://digitalcommons.unl.edu/libraryscience/335> (accessed June 2017).
- Deards, K. SciPop Talks! Where Science Intersects Pop Culture. Retrieved from <http://unl.libguides.com/scipoptalks> (accessed June 2017).
- Nulty, D. D. The adequacy of response rates to online and paper surveys: What can be done? *Assessment & Evaluation in Higher Education* (2008) 33(3): 301-314.
- Brotman, J. S., and F. M. Moore. Girls and science: A review of four themes in the science education literature. *Journal of Research in Science Teaching* (2008) 45(9): 971-1002.
- Jones, M. G., A. Howe, and M. J. Rua. Gender differences in students' experiences, interests, and attitudes toward science and scientists. *Science Education* (2000) 84(2): 180-192.
- Krapp, A., and M. Prenzel. Research on interest in science: Theories, methods, and findings. *International Journal of Science Education* (2011) 33(1): 27-50.
- Osborne, J., S. Simon, and S. Collins. Attitudes towards science: A review of the literature and its implications. *International Journal of Science Education* (2003) 25(9): 1049-1079.
- National Science Teachers Association. Learning Science in Informal Environments. Retrieved from <http://www.nsta.org/about/positions/informal.aspx> (accessed June 2017).