

# The INNOVATOR

The Voice of the PSM

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## Message from the Editor



Welcome to the second edition of the NPSMA Innovator “curated” edition. Through the Innovator, the NPSMA continues its mission of bringing informative and actionable information

and resources to PSM program directors and others who have a commitment to revitalizing and reinventing professional masters education in the sciences. The papers in this issue touch on key issues for PSM programs, such as the use and validity of the Graduate Record Examination (GRE) in the admissions process, and the value to and visibility of the PSM to employers. Moreover, we have included two pieces on marketing PSM degrees, both to the students who will enroll in them, and to the companies and agencies who will hire our graduates -- an increasingly important activity too often neglected or dismissed by many in higher education, but a necessity that every PSM program director can no longer afford to neglect.

## OPINION ARTICLE

### Reconsideration of GRE Exam Utility in PSM Program Admissions

Gerald B. Grunwald

**N**OW INTO ITS SEVENTH DECADE, the Graduate Record Exam or GRE has been a mainstay of graduate program admissions requirements for most U.S.-accredited MS and PhD programs. As administered by the Education Testing Service (ETS), the exam’s structure, content, platform, and interpretation have evolved over this time period, especially in recent years. For some time, and at a currently accelerating pace, there has also been discussion at the institutional and national levels of the role of the GRE exam in the graduate admissions process, as evidenced through both published commentaries as well as peer-review studies. There have been in addition a growing number of graduate programs that have made the GRE exam optional in their admissions process. This article is intended to stimulate discussion on the role of the GRE exam in graduate admissions among the PSM community.

### Considerations of the GRE Exam and Graduate Admissions Policies and Practices

With respect to Professional Science Masters (PSM) programs, and for those of us who are engaged in their administration and invested in their success, four intertwined themes related to the GRE exam are worthy of our consideration. The first two are discussion points focused on the GRE exam itself, these being (1) questions regarding the value of the GRE exam as a predictor of graduate student success and thus its utility as component in the graduate admissions process, and (2) expressions of concern regarding the stronger correlation of GRE exam scores with the race, gender and/or socioeconomic status of the test takers, rather than correlating with ultimate graduate student success. These perspectives have received increased scrutiny as graduate programs continually seek to (3) improve both the efficiency and effectiveness of admissions policies and procedures as well as couple these to outcomes analysis and reporting, while at the same time (4) also seeking to fulfill the mission of enhancing the diversity and inclusiveness of graduate

education and training programs and thus the ultimate diversity of the workforce populated by our graduates.

## Experience from the Biomedical PhD Training Program Community

Most of the active discussion, published commentary and peer-reviewed studies with which the present author is familiar have been focused on PhD programs in general and STEM/Biomedical fields in particular. Among such recent commentaries, a 2014 Nature Careers Column by Miller and Stassun entitled “A Test that Fails” questions the validity of the GRE exam as an assessment tool for graduate admissions and also suggests it may have a negative impact on diversity efforts with respect to women and minorities in graduate STEM programs, citing data from the ETS in their conclusions. Indeed while ETS itself recommends against using the GRE exam as a stringent filter in admissions review, and provides guidance and resources towards this end, these authors nevertheless express concern about the potential misuse of GRE scores given the relative ease of applying them as a quantitative screen or threshold. Instead, they recommend taking a more holistic approach that de-emphasizes the GRE exam and takes into account critical while nevertheless harder to quantify attributes such as: the drive to achieve objectives; diligence and resiliency in the face of the challenges and adversity inherent in scientific research; and the range of prior practical experiences that may contribute to success as a novice and future researcher.

A number of more recently published and peer-reviewed studies during 2017-2018 have presented analyses of single-institution PhD student cohorts, with respect to graduate program admissions and outcomes including GRE exam considerations. In a study of potential predictors of biomedical PhD program student success as measured by publications and degree completion, Hall and colleagues found the GRE exam to be, in their words, “a particularly ineffective tool” compared to other more qualitative parameters such as may be obtained from letters of recommendation. They found no single quantitative parameter, even undergraduate GPAs, to be a single overriding strong predictor of success, and suggest a multidimensional holistic approach to admissions. Similar conclusions were reached in another study by Moneta-Koehler and colleagues, who analyzed another cohort of biomedical PhD graduate program

students, where they found no useful correlation of GRE exam scores with student outcomes measures including performance on oral exams, time to degree completion, or research publications. As part of another broad study of career outcomes among a 15 year cohort of biomedical doctoral program students, including comparison of successful pursuit of traditional academic versus non-academic employment sectors, the analysis by Mathur and colleagues found no statistically significant correlation with GRE exams. While these studies were directed at

Instead, they recommend taking a more holistic approach that de-emphasizes the GRE exam and takes into account critical while nevertheless harder to quantify attributes such as: the drive to achieve objectives; diligence and resiliency in the face of the challenges and adversity inherent in scientific research; and the range of prior practical experiences that may contribute to success as a novice and future researcher.

populations of biomedical PhD students, the insights gained are likely relevant to master’s STEM program in general and PSM programs in particular. These studies also highlight the importance of conducting similar future analyses of MS and PSM program admissions policies, including use of the GRE exam, and the relationship to student outcomes.

## Relevance to MS and PSM Programs and a Call to Action

At the author’s college, as we considered changes to our own admissions policy, which previously included the GRE exam as a requirement for all of our MS and PhD programs, we found it difficult to separate these two major program cohorts in principle with respect to our internal discussion and decision-making process. As a result, for the 2018-2019 academic year, after considerable discussion across the leadership of all of our college’s graduate

programs, the Jefferson College of Life Sciences decided to make the GRE exam optional for all of our MS and PhD programs, with the only exception for now being one program where the pertinent accreditation agency is currently itself discussing the matter at the national level. As we move ahead, we will continue to monitor our application, admissions, and outcomes data to assess the impact of this decision.

While many institutions including our own have taken steps to modify our GRE requirements, there remains a continuing need to collect, analyze and disseminate data to inform ongoing policy and process development and share experiences and best practices. This may be especially relevant to the PSM community, as our potential students may include those for whom the GRE presents additional challenges due to circumstance producing a significant time gap between their undergraduate and graduate studies. Thus our programs and students may benefit from a change in GRE requirements on several counts, possibly yielding increasing and more diverse applications and enrollment. Our discussion and sharing of practices on this topic may also yield tangible products such as recommendations for a more holistic and common core rubric for guiding admissions decisions. In that spirit, please consider this article as a call to action to become engaged in a dialogue about the future of the GRE exam in the PSM program admissions process. To inform our own discussion, the NPSMA Board of Directors is seeking information regarding your institutional policies, practices and experience with respect to GRE exam requirements in the context of PSM program admissions. As a first step, we welcome your comments as well as any specific policies or supporting data, which could help to inform future policies and practices, and which may be submitted to the author at the below email address. It is our intention to begin to collate information obtained from the PSM community for inclusion in a future article on this topic for The NPSMA Innovator so that we may share our findings back in support of ongoing dialogue and informed decision making on this topic.

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ETS GRE Board Statement <https://www.ets.org/gre/institutions/scores/guidelines/>

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## IN PRACTICE ARTICLE

### Analysis of Marketing Practice in the PSM Community

Heidi March, Heidi Harkins, and Ray J. Hoobler

**T**HE NEED TO MARKET HIGHER EDUCATION PROGRAMS IS NOT NEW. Philip Kotler and Patrick Murphy address multiple aspects of marketing in their 1981 article “Strategic Planning for Higher Education” (Kotler & Murphy, 1981) and the opening quote from the article rings true today:

Institutions will be compelled to become more introspective and analytical, to undertake long-range planning, something they did not have to do in good times. They will be forced to set priorities and develop strategies, overcome institutional inertia and make long-overdue choices—for example, to identify areas of growing student interest and create new programs to replace those for which demand may have fallen off. A consumer orientation will benefit higher education.

Many of the tasks outlined in the article—environmental analysis, resource analysis, goal formulation, strategy formulation, etc.—are the domain of marketing.

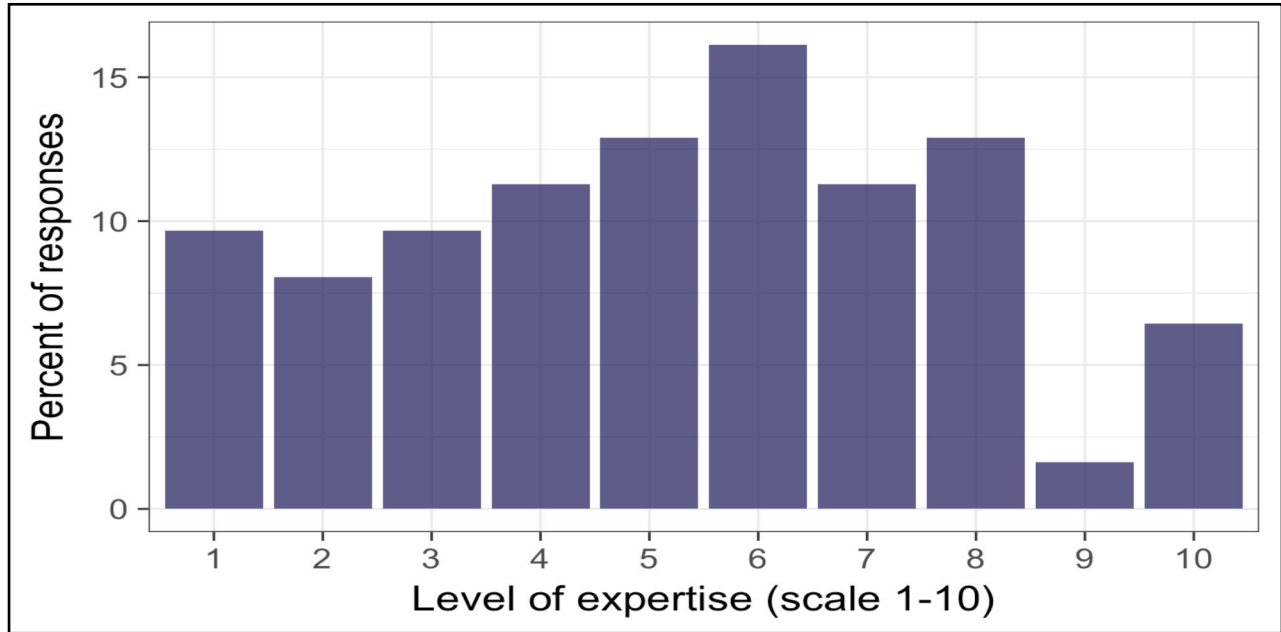
Marketing is often viewed through the lens of promotion; however, promotion is only one aspect of the endeavor. Marketing professionals define the product, justify pricing based on market demands or trends, and specify the place of delivery (e.g. courses offered by day, evening, weekend, off-campus, online). The ubiquitous 4 Ps of marketing—Product, Price, Place, Promotion—apply to marketing programs in higher education, but translating marketing management to university programs presents some unique challenges. For example, lack of time, expertise, and financial resources are among the constraints that can limit marketing efforts in higher education.

As marketing is a challenge faced by all PSM program directors, the 2017 NPSMA pre-conference workshop focused on how to market PSM programs. To inform the workshop discussion and better understand specific challenges program directors face, the workshop planning committee surveyed the marketing practices of PSM institutions and NPSMA members. The survey was sent to 415 individuals, all of whom were either NPSMA members (~140) or other contacts that signed up to be in the NPSMA database or the Commission on Affiliation of PSM Programs (previously the PSM National Office) database. Of those contacted, 91 started the survey and 64 completed it—a 15% response rate. This response rate is lower than expected given that voluntary internal surveys generally receive a 30-40% participation rate (Fryrear, 2015). This lower-than-typical response rate may be attributed to the fact that some of those who received the survey do not direct PSM programs, and therefore did not find the survey relevant.

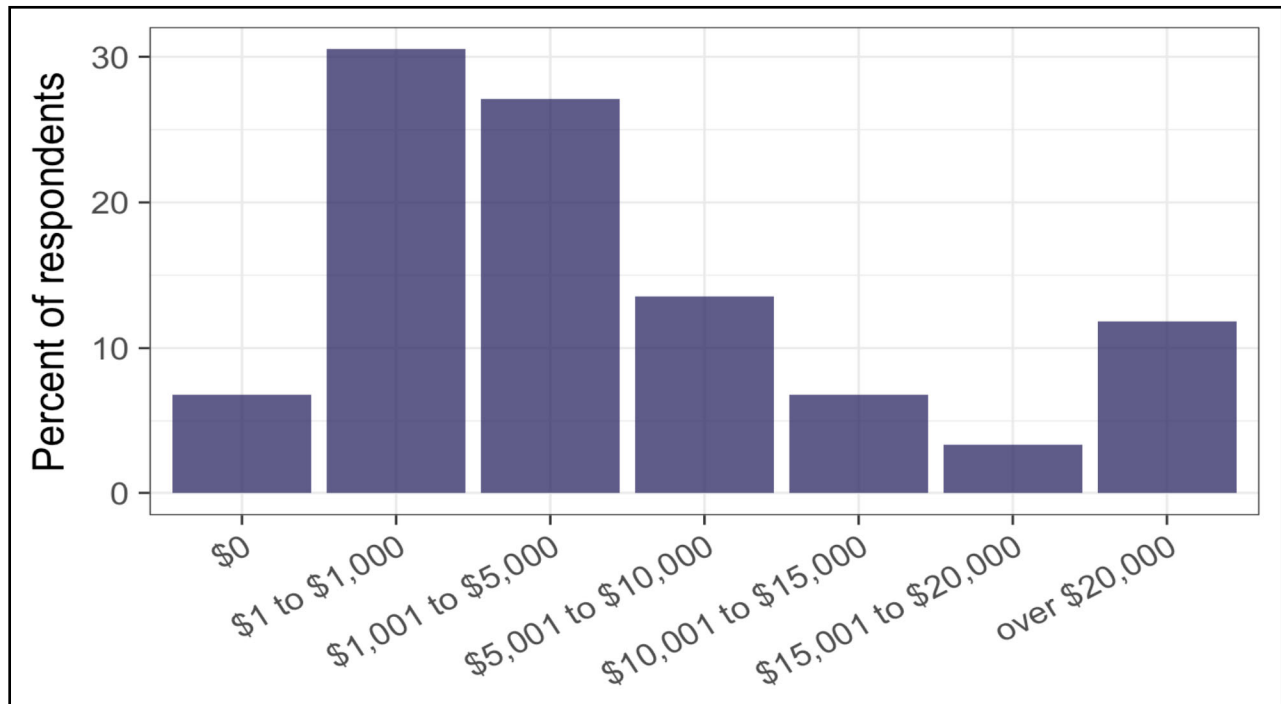
#### Survey Results

Who is primarily responsible for marketing? Given that (1) most university faculty focus on curriculum, (2) few colleges within a university engage in promoting their departments, and (3) most PSM programs have limited staff, it is not surprising that 52% of the survey respondents identified program directors as primarily responsible for marketing their program. 26% identified other faculty/administrators as primarily responsible, while 23% identified a university marketing group. The importance of marketing PSM programs has been raised over the last several years at the annual NPSMA conference; however, no respondents reported an external organization as having primary responsibility for marketing their programs. These results are not surprising given the budget constraints survey respondents reported, discussed later in this article (Figure 2).

Survey respondents were asked to rate the marketing expertise of the responsible person (Figure 1) on a scale of 1 (least expertise) to 10 (most exper-



**Figure 1.** Q: How would you rate the marketing expertise of the responsible person/organization (i.e. the person/organization you indicated in the question above as primarily responsible) on a scale of 1 (least expertise) to 10 (most expertise)?



**Figure 2.** Q: What is your annual program marketing budget?

tise). The response was flat, with similar numbers of respondents indicating no marketing expertise of the responsible person (10% selected a 1 on the scale) and those reporting a relatively high level of marketing expertise (~12% choose 7 or 8 on the scale). A combined 8% of the respondents did indicate a high level of knowledge, selecting 9 or 10 on the scale.

While respondents rated their marketing expertise broadly, marketing budgets were more tightly grouped. Of the survey responses, over 60% of the respondents indicated marketing budgets of less than \$5,000—with 30% reporting budgets of less than \$1,000. Several programs reported budgets over \$20,000; however, it is not clear if the reported budget is for the individual programs or for the entire graduate school, although the question specifically asked for the “program marketing budget.”

Given the relatively small marketing budgets of most programs, it makes sense that PSM program marketing efforts use a variety of low-cost, web-based, marketing channels. Among the 14 options to the questions “How do you market your programs?”, program websites were the most common tool, with 90% of the respondents indicating use of this channel. This can be a low-cost marketing tool for many programs, as most websites are provided and maintained by the university. However, it should be noted that there can be significant cost to maintain and update web content if the program’s personnel are not able to do so. Attending graduate school fairs was the second most frequent marketing method (71%). Only two other methods were at or above 50%—digital marketing (Facebook/LinkedIn/Google/etc.) and Facebook were selected by 54.8% and 50.0% of the respondents, respectively. At the other end of the spectrum, 8% of the respondents noted using an external marketing firm. We provide the complete list and the corresponding responses in Figure 3.

In addition to the survey choices, respondents were given an opportunity to describe additional methods they use to promote their program. These are summarized in Table 2. The list demonstrates a variety of channels that may arise as planned or impromptu marketing opportunities.

Respondents indicated the majority of their marketing efforts are directed to digital over traditional marketing by a 3:2 ratio. The question listed “social media, email, web, etc.” as digital methods and “print, radio, outreach, etc.” as traditional methods. In Figure 4 we see the most likely response for

digital efforts at 70% of effort and traditional efforts at approximately 30%.

**Table 1.** Additional marketing methods used by PSM programs

**Traditional Advertising:**

- magazines and newspapers
- student/university papers and magazines
- Posters on mass transit
- Mailing of brochures and posters to targeted undergraduate programs

**University Events:**

- Campus career fairs
- Information sessions

**University Publications:**

- Course Catalogs
- Graduate Handbooks

**Community:**

- Extension/Outreach events
- Meetup groups

**Conferences**

**Alumni**

- Emails through CRM
- Program records

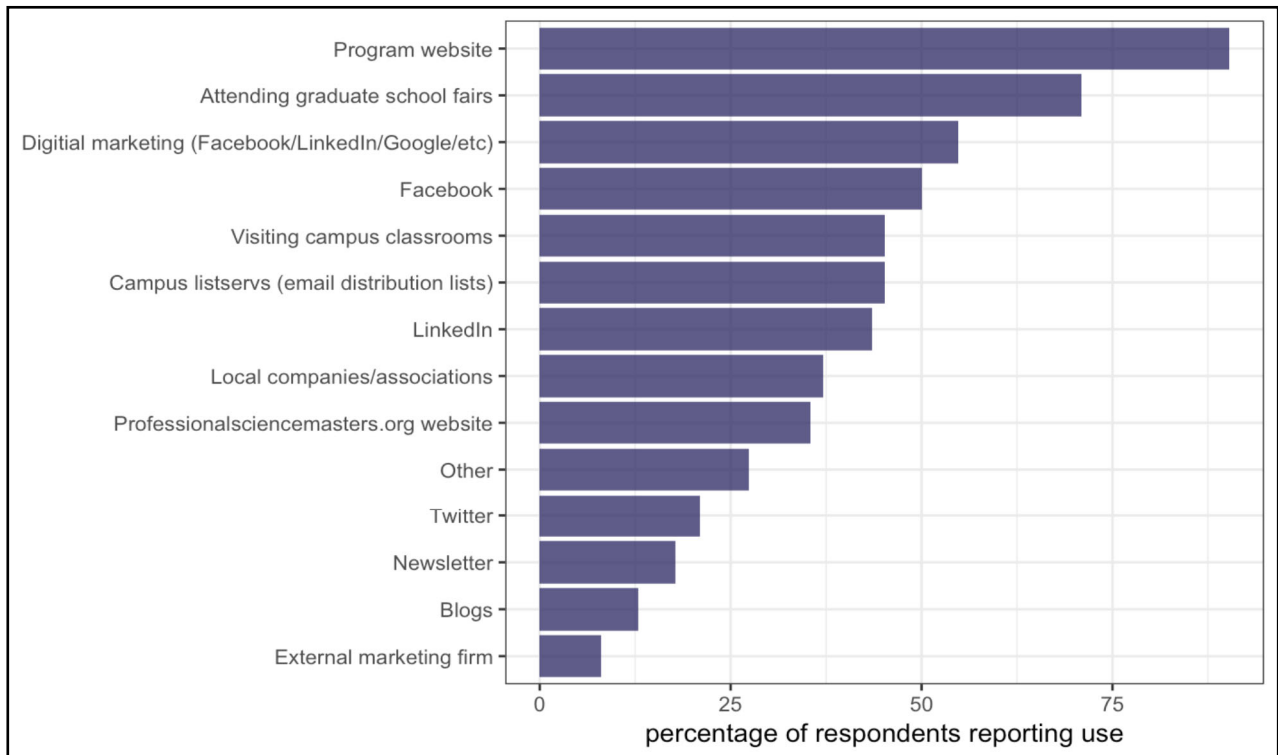
**Emails to GRE test takers**

**Webinars**

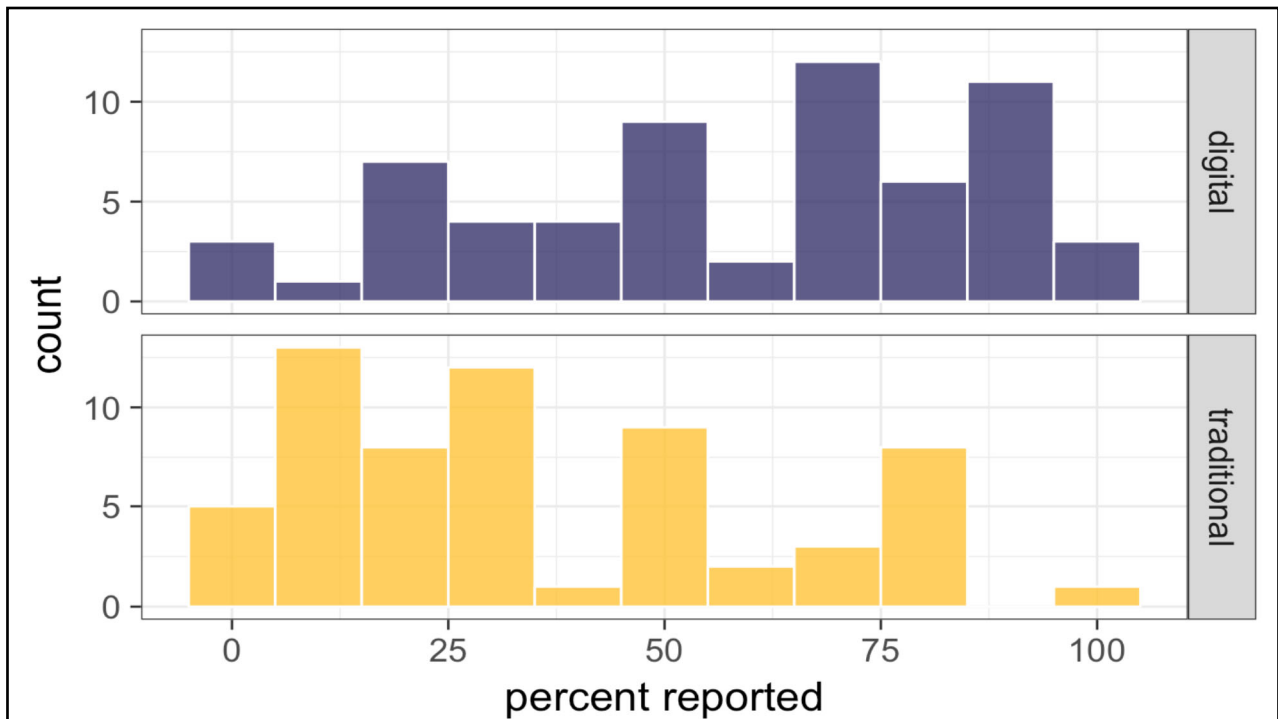
**Word of mouth**

This preference for digital marketing reflects a general marketing trend in the United States; digital marketing has increased its share of dollars spent from 17.1% in 2010, to 32.6% in 2015. During that same period, print methods (magazines, newspapers, directories) have declined from 30.5% to 17.9% (“Advertising spending in the U.S. by media 2017 | Statistic,” 2016).

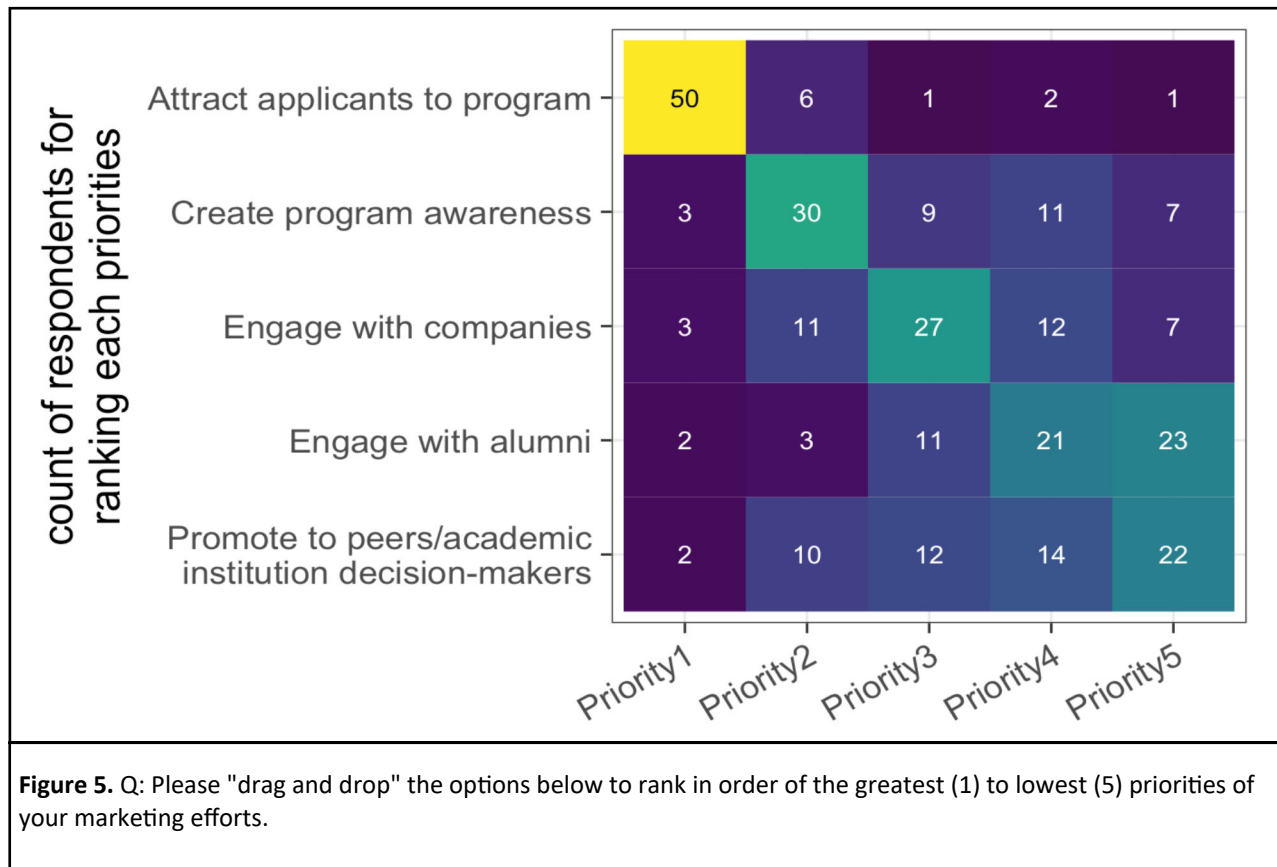
There are advantages and disadvantages to using social media to market programs. As the dominant social media platforms for individuals and “businesses,” Facebook and LinkedIn provide free



**Figure 3.** Q: How do you market your PSM program? (Please select all that apply)



**Figure 4.** Q: Please click and drag in each bar from 0% to 100% to indicate the percentage of your marketing efforts dedicated to "traditional" and digital marketing methods. (Note the two percentages should sum to 100%.)



space for "program pages" (Facebook), and "company pages" and "groups" (LinkedIn). These social media platforms, however, limit how content is displayed, and this could be considered a disadvantage over a program website that allows significant control over the content and layout. Using social media platforms to promote PSM programs also requires a time commitment that may not be possible for many program directors (or other responsible individuals), especially if they are unfamiliar with the numerous options of the platforms.

The survey results showed—not surprisingly—that attracting applicants to PSM programs is the highest marketing priority (Figure 5). Over 83% (50 of the 60 responses) indicated attracting applicants as their top priority. The second and third marketing priorities were "creating program awareness" and "engage with companies" at 50% and 45%, respectively. Respondents ranked promotion to peers/academic decision-makers and engagement with alumni as the lowest priority among the options.

Survey responses indicate that most programs do not market specifically to international students, with just 20% of respondents indicating they market intentionally to international students.

Finally, respondents were asked to rank four challenges in order of challenge priority: (1) lack of funds, (2) lack of understanding of PSM programs/degree, (3) lack of marketing expertise, and (4) lack of faculty knowledge of PSM programs. Consistent with an earlier survey question that highlighted low marketing budgets available to programs, nearly 44% (24 of 55 respondents) indicated "lack of funds" as their primary challenge. 48% of respondents indicated that lack of faculty knowledge of PSM programs was the least of their marketing challenges, of the four options provided. Respondents ranked the remaining two options (lack of understanding of PSM programs/degree, lack of marketing expertise) as an approximately equal concern, 24% to 29%, with 16 of 55 respondents ranking a lack of understanding of the PSM programs/degree as their top challenge. Lack of marketing expertise was ranked slightly lower; however, these two categories are nearly equal with 29 respondents ranking each of these challenges as either their top or second priority.

Survey respondents had an opportunity to offer additional thoughts about marketing challenges. Several common themes arose from the survey and



lack of time was expressed repeatedly as a significant challenge. Some comments from the survey:

"... solely a program director duty, thus this task does not receive the attention it should."

"... focus has been on meeting needs of students who find our program, rather than reaching out to expand it. Time constraints impact ability to market."

"... I wouldn't say it is lack of 'Marketing Expertise'—it's the lack of ... having the resources and time."

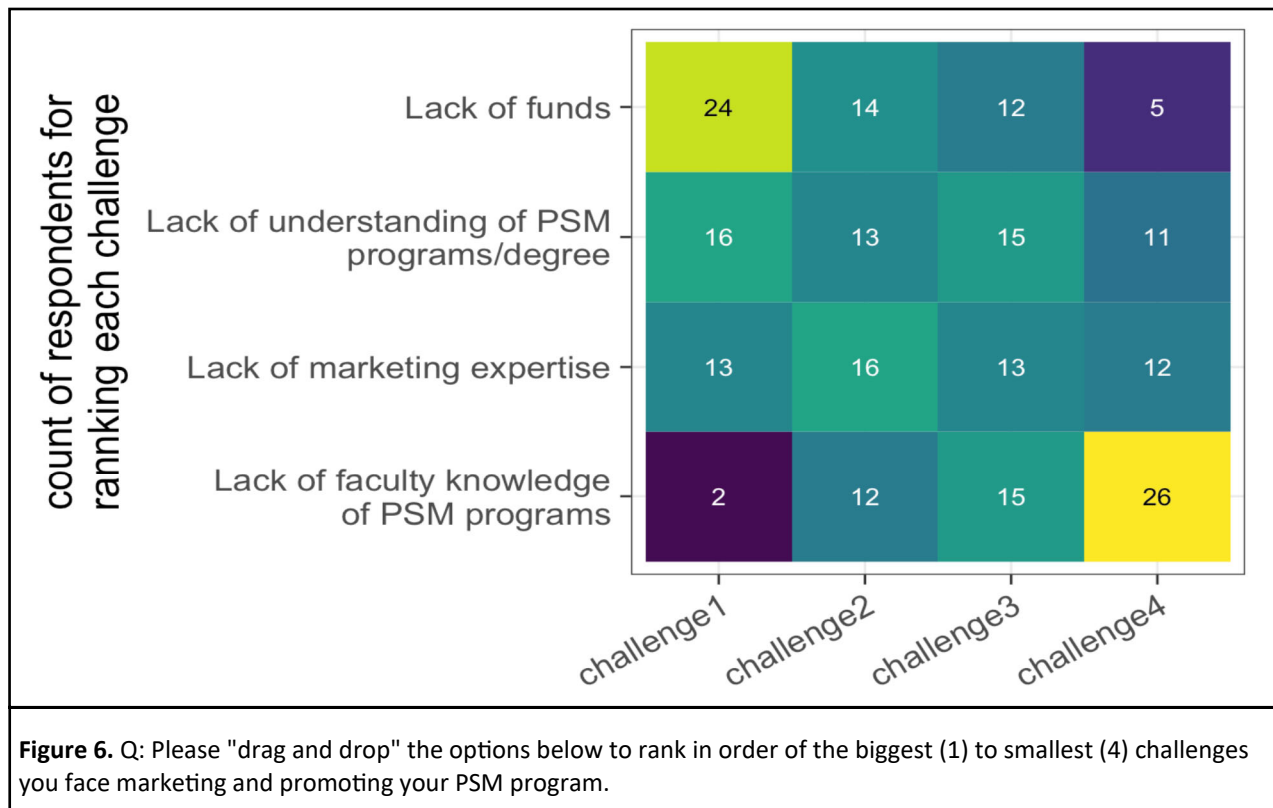
Respondents made several general recommendations for how NPSMA could support program marketing efforts:

- Buy Google AdWords for professionalsciencemasters.org
- Provide "bite-size" communications with PSM data to promote PSM programs that individual programs could repurpose
- Involve the Council of Graduate Schools to promote PSM programs

- Increase Washington, DC representation, for example, provide scholarships for students choosing the PSM degree program
- Provide monthly updates on NPSMA marketing efforts

Respondents also made recommendations on how the NPSMA could help market the PSM brand:

- Educate public and private sector HR about the PSM and ensure that the PSM is "counted" as a STEM/science degree in position descriptions, job searches, CV/resume evaluation, etc.
- Encourage HR departments to review their background requirements for jobs--many companies insist on thesis degrees as a required background for specific jobs that readily could be done by PSM graduates.
- Increase presence by national PSM Office and NPSMA at conferences/meetings to market and speak about the PSM degrees.
- Publish articles about the degree program's unique curriculum



## Discussion

Starting in 2017, the NPSMA has implemented several efforts that align with these requests above, including creating:

- Promotional materials for potential students, potential employers, and policy makers. NPSMA members have access to the native files that can be customized to fit their institution's branding and style guidelines.
- A "best known methods," or BKM, document is available that outlines an effective strategy for engaging with government relation officers.
- An infographic highlighting PSM program growth over 20-years.
- A 20<sup>th</sup> anniversary press release template that can be customized for individual programs.

These materials are available online ("NPSMA - Resources," 2017).

Additionally, in 2018, the NPSMA initiated a digital marketing campaign to build awareness of the PSM degree; results from this work will be presented at the NPSMA 2018 National Conference.

Attracting qualified applicants to PSM programs is a major concern for NPSMA members who are seeking guidance on effective marketing activities to meet this need. Not surprisingly, most programs work with modest budgets and a significant effort should be the focus on how to help program directors (or faculty) effectively market PSM programs with budgets under \$5,000.

There are significant challenges in marketing: providing materials that are current, that can be adapted to fit the wide variety of PSM fields of study, and—most importantly—that move potential students to apply to a PSM program are needed. Members of the NPSMA are working to create such materials that can be shared with the membership.

Have you found an effective strategy for marketing your PSM program? Share what you've learned with the NPSMA community by posting an article online via LinkedIn, contributing to the NPSMA Newsletter, hosting an "Ask NPSMA" webinar, or writing an article for the Innovator.

Looking for additional support? Email [npsma@npsma.org](mailto:npsma@npsma.org).

## Useful resources

- Getting started with Facebook Pages: <https://www.facebook.com/business/learn/facebook-page-basics>
- Getting started with Facebook Ads: <https://www.facebook.com/business/news/How-Facebook-Ads-Work>
- LinkedIn Group overview: <https://www.linkedin.com/help/linkedin/answer/1164>
- LinkedIn Company Page overview: <https://www.linkedin.com/help/linkedin/answer/28406>
- Getting started with LinkedIn Ads: <https://business.linkedin.com/marketing-solutions/get-started-emea>
- Design guidance for university websites: <https://www.nngroup.com/articles/university-sites/>
- NPSMA promotional materials and websites: <https://www.npsma.org/page-18069>

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## Author Information

Kelly March served as a Graduate Research Assistant for the Professional Science Master's programs at The University of North Carolina at Chapel Hill from 2015 to 2017 while pursuing her Master's in City and Regional Planning.

Heidi Harkins served as Executive Director of the Professional Science Master's programs for The Graduate School at The University of North Carolina at Chapel Hill from 2014 until 2018. UNC-Chapel Hill has three PSM programs: Biomedical and Health Informatics, Digital Curation, and Toxicology.

Ray Hoobler has served as PMST program Director since January 2016 and is responsible for strategic management of the program as well as admissions, recruiting, and marketing. The four PSM Affiliated programs are: Biotechnology, Computational and Data Science, Environmental Science, and Science Instrumentation. He brings 15-years of experience to the program having worked in product development, product management, and product marketing for large and small companies in Silicon Valley.

## IN PRACTICE ARTICLE

### Using Facebook Ads to Promote PSM Programs: A NPSMA Pilot Program

Ray J. Hoobler and Courtney Thornton

*The National Professional Science Master's Association conducted a pilot program from mid-May to mid-July, 2018 using Facebook Ads to promote the [professionalsciencemasters.com](http://professionalsciencemasters.com) website and direct leads to programs in California and New York. Overall results were positive, with the ads viewed over 225,000 times and generating 440 leads. The cost of this campaign was \$5,000 with just over \$4,000 being directly associated with purchasing the ads. The pilot program provides a framework for individual programs to create lead generation campaigns to attract qualified applicants to their programs and demonstrates one way the national association could help promote the PSM model.*

**Keywords:** Facebook Ads, digital marketing, lead generation, recruitment, enrollment

**R**ECRUITMENT OF QUALIFIED STUDENTS INTO PSM PROGRAMS RANKS AS A TOP CONCERN for program directors and academic leaders, and digital marketing has eclipsed traditional methods for promoting individual programs (Harkins, 2017). The use of free, or very low cost, digital channels such as program websites, Facebook pages, and LinkedIn groups dominate this space. Social media platforms like Facebook allow higher education institutions, departments, and programs to build brand awareness, increase the number of visitors to degree program sites, and generate applicant leads. Social media allows the advertiser multiple options to identify a target audience, including: location, age, educational background, and interest—such as graduate school in general or specific areas of study.

As a member-serving organization, the NPSMA was interested in exploring the benefits of an association-led social media promotion of PSMs. From mid-May through mid-July 2018, the NPSMA worked with Advantage Marketing to design and execute an exploratory Facebook Ad campaign to promote select PSMs. For this pilot campaign, we selected the high population states of California and New York which have 26 and 37 PSM programs, respectively. The population target included over 80,000 individuals, age 24-32, with undergraduate degrees in select STEM fields closely related to PSMs offered in the two states. In addition to tracking leads, the campaign was used to test visitor responses to two sets of text and four images.

### Summary of the Campaign

Prior to launching the pilot campaign, the Commission on PSM Affiliation created dedicated landing pages for NY and CA. They added digital markers (pixels) provided by Facebook to the html code for each page. This additional code allows page views and actions to be tracked. The preparatory work to develop landing pages, the corresponding text, and integrate the html code took several weeks to implement.

Advantage Marketing developed and launched the Facebook ads to reach the target populations in NY and CA. The Facebook Ad was designed to lead visitors to a dedicated landing page which listed all PSM programs for their target state. The visitor could then filter the page by field of study using a dropdown box. The choices were:

- Agricultural Science/Food Science/Nutrition
- Biotechnology/Biomedical/Pharmaceutical
- Computer Science/Analytics/Big Data/Statistics
- Environmental Science/Ocean Science/Sustainability/GIS
- Physical/Chemical Sciences
- Other

If the visitor selected a field of study, then a table was displayed with relevant program names, institution names, and location (state) as well as a “Learn more” link. The “Learn more” link for a specific PSM program directed the visitor to the program’s

**Table 1.** Summary of data from the California and New York Facebook Ad campaigns.

State	Results	Reach	Impressions
CA	195	54,280	110,554
NY	245	53,763	114,906

page on [professionalsciencemasters.com](http://professionalsciencemasters.com). Clicking on the “Learn more” link from the landing pages counted as a “result” or lead for this study. Other definitions used by Facebook include (Advertising Basics, n.d.):

**Impression:** the number of times an instance of an ad was on screen for the first time.

**Reach:** The number of people who saw an ad at least once.

**Results (Leads):** The number of times an ad achieved an outcome, based on the objective and settings selected.

As shown in Table 1, the distribution of reported metrics between the two states was uniform.

We also looked at data on which visual and text choice generated the most leads. Results are summarized in Table 2. Additionally, we sorted the table by Reach for each state. The Ad Code column is an index for the visual used (v1, v2, v3, v4) and the text (t1, t2).

The two sets of text were used during the ad campaign:

- *Degrees designed with employers and feature learning in real-world environments. Graduates are science professionals equipped to meet the STEM workforce demands of the 21st century.* (t2, more effective)
- *Designed for science and mathematics professionals who understand the need for developing workplace skills valued by top employers.* (t1, Less effective)

In order to determine which text was more effective, we summed the total count of results and reaches for each text option and determined a ratio. The more

**Table 2.** Detail data by Ad Code from the California and New York Facebook Ad campaigns.

State	Ad Code	Results	Reach	Impressions	Amount Spent	Clicks
CA	v1t2	81	16094	40065	\$757.16	217
CA	v4t2	45	12718	26654	\$530.76	182
CA	v3t1	38	8367	18603	\$327.71	95
CA	v1t1	11	5907	8541	\$172.00	38
CA	v2t2	8	3746	5733	\$104.63	21
CA	v2t1	10	2872	4190	\$66.87	15
CA	v4t1	2	2738	3984	\$71.46	14
CA	v3t2	0	1838	2784	\$51.41	12
NY	v4t2	105	23309	53602	\$963.06	282
NY	v1t2	108	12696	37145	\$665.35	255
NY	v2t2	19	4814	7443	\$138.53	42
NY	v1t1	2	3491	4455	\$86.51	22
NY	v3t2	4	3267	4302	\$80.03	22
NY	v4t1	7	2709	3448	\$68.50	13
NY	v3t1	0	1966	2631	\$49.13	10
NY	v2t1	0	1511	1880	\$30.99	6



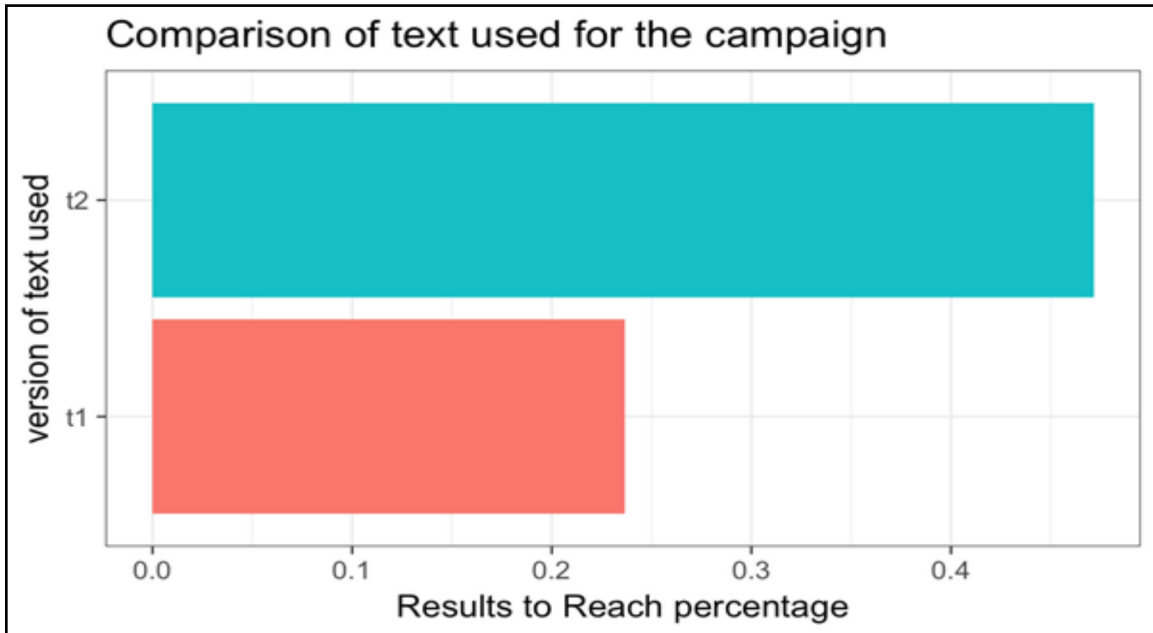


Figure 1. Percentage of results to reach showing preference for "t2" ad text.

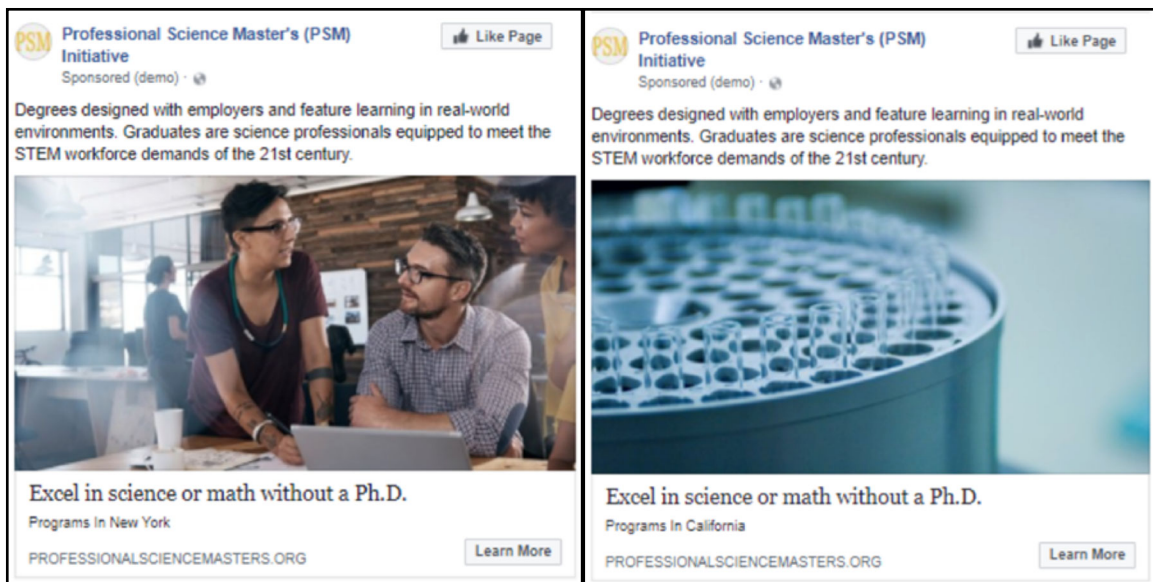


Figure 2. Example Facebook Ad from the 2018 campaign. Visuals 2(left) and 4(right), text 2.



**Figure 3.** Example Facebook Ads from the 2018 campaign. Visuals 1(top) and 3(bottom), text 1.

effective text results had a results-to-reach ratio of approximately 2:1. In other words, individuals who saw the Facebook ad using t2 text were twice as likely to click through (Figure 1). Figures 2 and 3 show representative Facebook Ads for the campaign. Visuals 1 and 3 (Figure 3) showed an individual in a scientific endeavor; Visual 2 showed two individuals (students) meeting; Visual 4 (Figure 2) showed a collection of test tubes. In order to determine which visual was more effective, we summed the total count of results and reaches for each visual option and determined a ratio. The most effective visual results had a results-to-reach ratio of approximately 2:1. In other words, individuals who saw the Facebook ad using Visual 1 text were twice as likely to click through as those seeing Visuals 2 or 3 (Figure 4). We show the aggregate count for visual and text combinations in Figures 5 and 6. While it is

difficult to know why a message or visual works, using analytics allows us to continually refine the message to reach the largest audience.

## Discussion and Conclusions

With a modest outlay, we have demonstrated that Facebook Ads increase awareness of PSM programs for a targeted audience and have tracked the actions of viewers of the ad. The current campaign reached over 100,000 viewers, and while the Results were modest with 440 leads generated, most PSM programs could benefit significantly from a modest increase in the number of highly qualified applicants and enrolled students.

Deciding which programs to promote was a challenge for the pilot campaign. If the pilot had not been geographically targeted in some way, the small investment would not have yielded meaningful results about user patterns and behaviors. As stated, we chose California and New York states because of their large populations and relatively large number of PSM programs. This pilot efficiently directed visitors to programs only in their state of origin, hence targeting in-state enrollees. We recommend that any future investment by the national association in a social media campaign should direct visitors to the general PSM Program Locator for broader exploration of online or out-of-state program options.

Additionally, our approach made tracking true leads difficult. A more rigorous definition of a “lead” would require contact information be collected as part of the process. In this case the Results were interested applicants choosing to go to a specific program’s website. In practice, the Learn More option would require an interested party to fill out contact information using a Facebook Lead Ad or direct the contact to a dedicated landing page that ask for their information (Chard, 2016). A more effective Facebook ad campaign, in terms of specific lead generation, may be one where individual programs pursue Facebook ad campaigns directly or where the NPSMA partners with individual programs whose websites are set up to capture lead contact information.

It is difficult to know from this pilot why certain text or visuals appealed more than others, although preferences were clear. The less effective text referenced “science and math professionals.” Individuals who would not describe themselves in

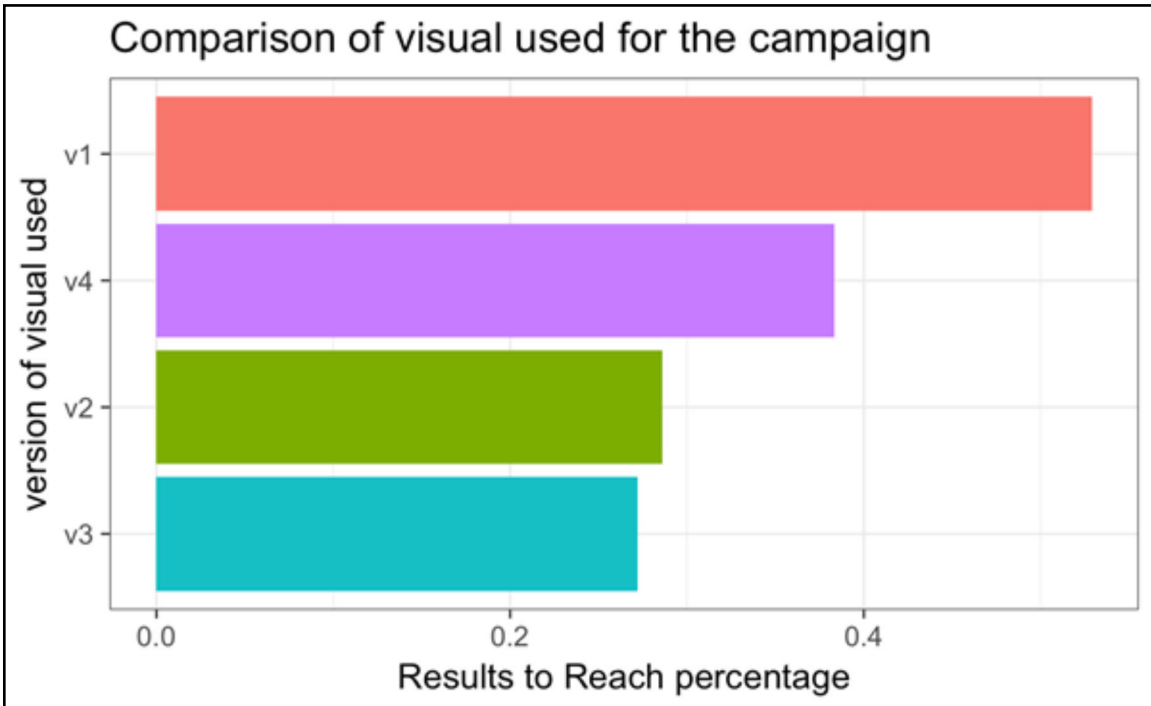


Figure 4. Percentage of results to reach for visuals. Order is ranked by preference.

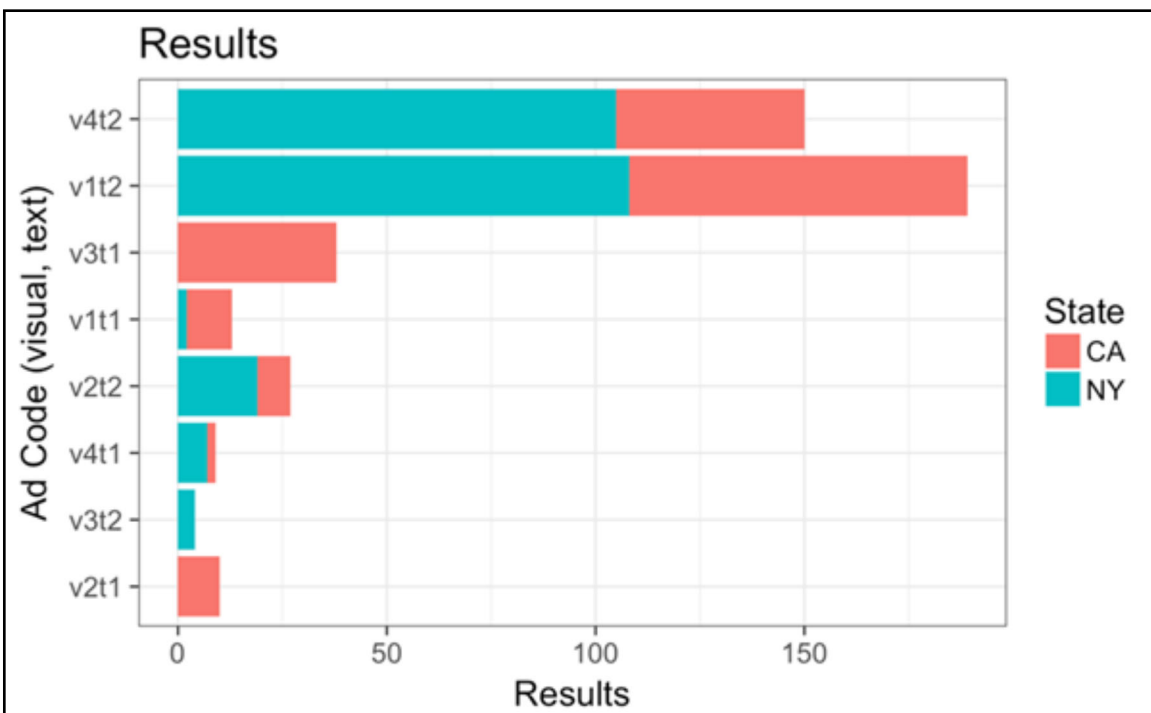
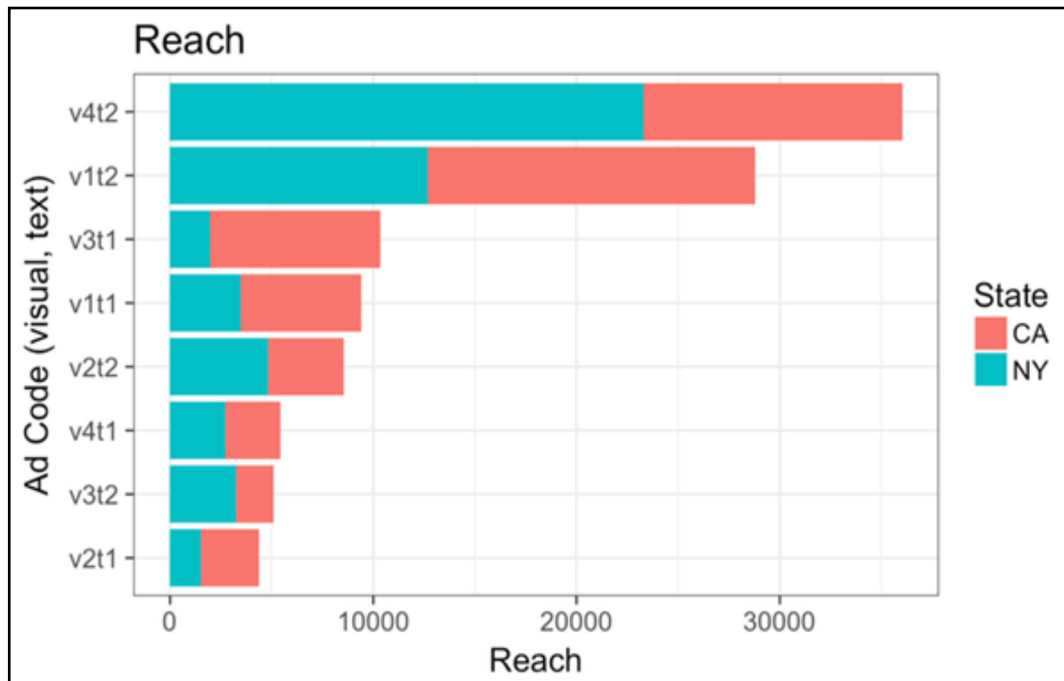


Figure 5. Total Results count for Facebook Ads.



**Figure 6.** Total Reach count for Facebook Ads.

this way may have overlooked the ad as irrelevant to them, whereas the more effective text was written in such a way as to not exclude anyone from the possibility of earning a PSM.

We consider this a first step in NPSMA's efforts to help program directors and coordinators develop effective marketing tools to maximize their program enrollments and to explore the association's role in social media marketing.

## Acknowledgements

We thank Spencer Hadelman of Advantage Marketing ([spencer@advantagemrkt.com](mailto:spencer@advantagemrkt.com)) for his open approach to partnering with the NPSMA and the Commission on Affiliation of PSM programs to develop and launch this campaign. We also thank Jim Sterling and Kiriko Komura of the Commission for their assistance in developing the pilot landing pages and tracking leads via the PSM website.

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## Author Information

Ray Hoobler has served as PMST program Director since January 2016 and is responsible for strategic management of the program as well as admissions, recruiting, and marketing. The four PSM Affiliated programs are: Biotechnology, Computational and Data Science, Environmental Science, and Science Instrumentation. He brings 15-years of experience to the program having worked in product development, product management, and product marketing for large and small companies in Silicon Valley.

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## IN PRACTICE ARTICLE

### Data-based Support of PSM Programs

Kiriko Komura and James Sterling

**T**HE COMMISSION ON AFFILIATION OF PSM PROGRAMS (THE COMMISSION) is committed to the administration of the PSM Affiliation process and the collection, maintenance and communication of program enrollment and degrees data and recent graduate assessment data. The PSM Affiliation process, originally established by the Council of Graduate Schools, works to ensure that each program meets PSM guidelines. Much of the work of the Commission is focused on supporting PSM program directors and academic leadership through the affiliation application process, the guidelines, and questions asked in the application forms. In addition to inquiries regarding program affiliation, the Commission also routinely addresses inquiries that center around “what other information is available regarding PSMs”? For example, prospective students who consider applying for master’s degrees like PSM programs might ask, “Do you have any information available to search for PSM programs in my field of study?” The Commission office also responds to inquiries from students and educators from abroad, typically European and Asian countries. Though roughly 300 PSM affiliated programs exist, the Commission, guided by the leadership of its Steering Committee, has identified how these important questions require careful consideration and ongoing review of the PSM community’s data needs.

In response to such inquiries and understanding the challenges in PSM program marketing, the PSM commission supports the PSM community with materials regarding best practices and access to reports and data. Between 2015 and 2016, the Commission launched an effort to substantially improve the PSM website [www.professionalsciencemasters.org](http://www.professionalsciencemasters.org). The improved website includes a new design with considerations for mobile users. Additionally, a new featured page contains easy to access information on all PSM programs. This page provides information

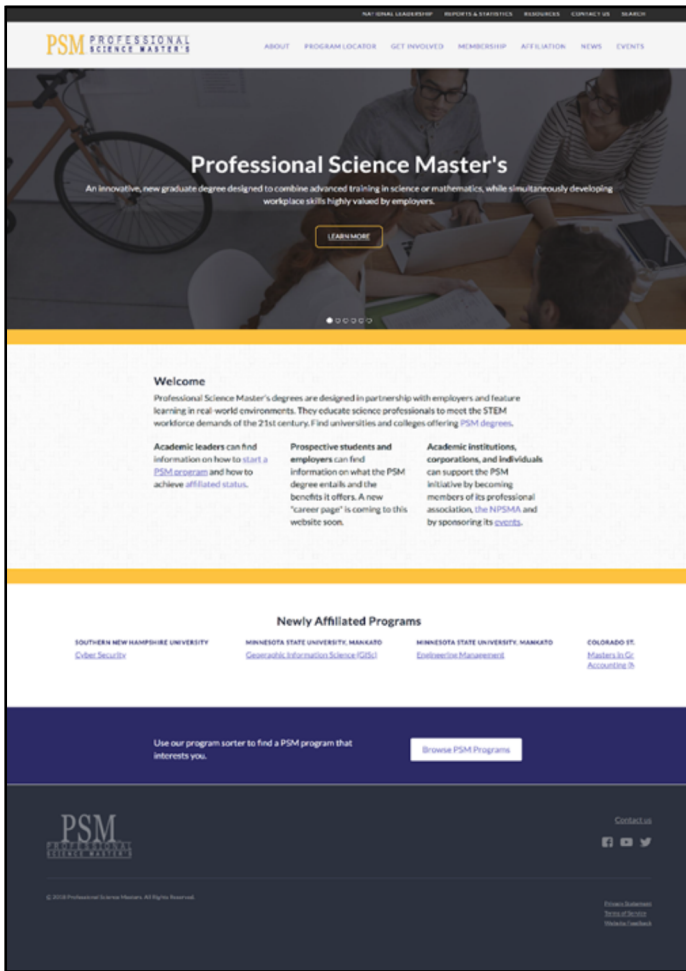
for both prospective PSM institutions and prospective students, where they can browse and search each individual PSM program’s information by field of study, institution name, location, and delivery method. Once a user selects the program’s information page, the user is navigated to click such links as “learn more” to progress to each institution’s program’s homepage. This module is called the “Program Locator”. Furthermore, PSM *history* and *reports & statistics* pages were inserted to support PSM programs’ staff and faculty, employers and policy makers, so they can better recognize PSM’s innovative science and engineering education. These pages include the studies conducted by the Council of Graduate Schools (CGS), which contains reliable data about PSM student *outcomes* and *enrollments & degrees*.

Since the improvements to the website were executed, traffic on the website has increased. Additionally, stemming from the project implementation, an additional twenty new PSM programs joined our community in the 2016-17 academic year.

In collaboration with the NPSMA, website content has been added to explicitly describe the benefits of PSM affiliation and provide additional information about academic membership, events, news, and frequently asked questions (FAQ’s), including content developed with Dr. Strausbaugh, Director of Strategic Initiatives of the NPSMA. Social media presence is an ongoing effort and the PSM community is encouraged to visit the Facebook, Youtube, and Twitter pages by clicking on the respective logos at the bottom of the webpage. The additional content is designed to engage students, staff, and faculty members to grow our community. In spite of positive feedback about the website development progress, the need for more data-driven design has been identified during annual meetings and the PSM commission’s steering committee meetings. In particular, the impact of the website on program marketing to prospective students is a subject of ongoing

The PSM Affiliation process, originally established by the Council of Graduate Schools, works to ensure that each program meet PSM guidelines.





ing discussions and plans are underway to launch a Commission Data Collection, Analysis, and Review Committee to advise and guide efforts to track the effectiveness of the PSM website. Please consider this the first of several solicitations to identify volunteers to participate in this important new group.

Having received feedback regarding the need for improvement in tracking the impact of communications and marketing, the Commission has been working on improved data visualization and data access since January 2018. Data visualization methodologies have become more important, particularly reflected through ‘data analytics’ programs becoming one of the featured newly affiliated PSM programs. Educational organizations report fast facts, student outcomes, strategic plans – not only for accreditation but also for student achievement and for marketing and development purposes. Moreover,

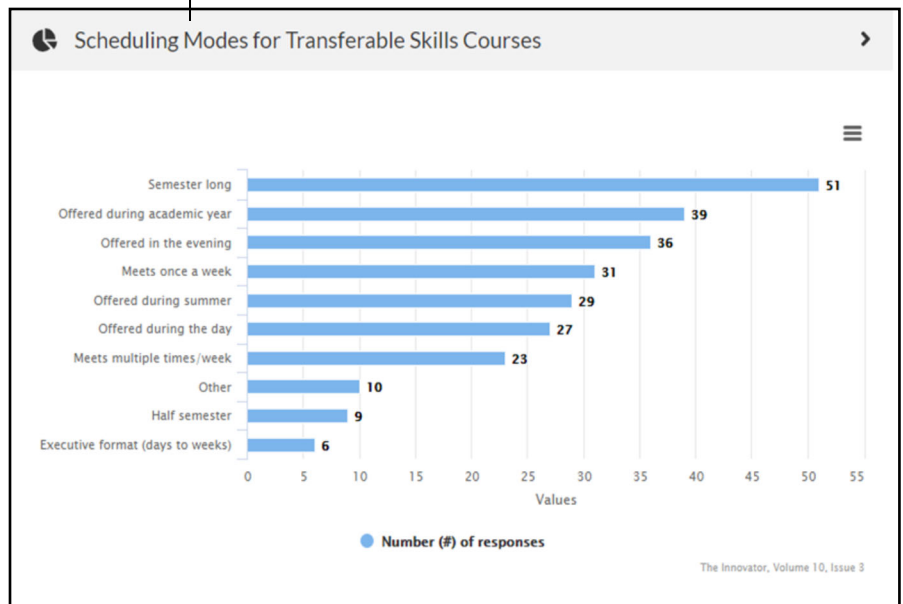
the data reported to the public by national organizations and foundations, such as the National Science Foundation (NSF) and the Integrated Postsecondary Education Data System (IPEDS), have begun incorporating visualizations for benchmarking and public-facing information such as financial aid, human resources and so on to help Institutions of Higher Education (IHE’s) with best practices.

The Commission team has implemented data visualization platforms on the Commission website by integrating data tables into current and previous reports and statistics. The visuals improve the user experience where infographics in many reports are tagged and sorted, automatically aligned with each data. Additionally, current PSM programs’ information is presented to demonstrate program trends. The data visualization page called “Visualize key information” has been well-received and has led to an increase in website traffic.

[www.professionalsciencemasters.org/reports-statistics/data-visualization](http://www.professionalsciencemasters.org/reports-statistics/data-visualization)

Specifically, this information page presents PSM programs’ STEM fields, Carnegie Classifications for Programs and Institutions, PSM Alumni Salary within the 5-year or less period after graduation (results from Outcomes for PSM alumni report 2017), and transferrable skills from PSM programs (The Innovator, Volume 10, Issue3). Such information is downloadable in customizable graphics with a user-friendly design, such as in the below example.

[www.professionalsciencemasters.org/reports-statistics](http://www.professionalsciencemasters.org/reports-statistics)





## OPINION ARTICLE

### A Message to Employers: Homegrown Solutions for the High Technology Workforce

Todd E. Arnold and Michael Moskal

**T**HE CHALLENGE FACED BY U.S. COMPANIES IN EXPANDING HIGH TECHNOLOGY JOBS and in identifying and cultivating a talent pool to meet workforce demands has been extensively reported in recent years<sup>1</sup>. Uncertainty surrounding immigration policies has further exacerbated the problem. Professional Science Master's (PSM) programs offer a homegrown solution to alleviate the shortage of high technology workers through the development and implementation of curricula targeted for placement of graduates in high technology careers. Initiated about 20 years ago to address gaps in STEM workforce development, PSM programs are now offered at more than 150 universities across the nation and in a wide range of current and emerging in-demand scientific fields<sup>2</sup>.

Employers often ask: how is the PSM different from a traditional master's degree? The short answer is that PSM programs have a mandatory and mutually beneficial partnership with companies, industries, and non-profits that shape the education of career-ready graduates. Every PSM branded program is required to have an active and engaged external employer advisory board to keep abreast of workforce demands and evolving needs. In addition to disciplinary expertise, PSM students are provided broader, application-based education and hands-on experiences that contribute to workplace success but are absent from traditional graduate programs. Examples include communication skills, business fundamentals, management and teamwork, ethics, and data analysis. Most importantly, PSM students experience workplace immersion through internships, industry projects, or other capstone experiences<sup>3</sup>.

As employers of PSM graduates from in-demand hiring sectors of biomedical, information technology and defense, we can attest to quality and job-readiness from experience. Over the past eighteen years, the authors have hired more than twenty-five PSM graduates into our companies. These students arrive prepared to make an immediate impact at an organization due to their programs' well-refined curricula including a combination of focus

on problem-solving and effective communication. Furthermore, the requirement of an internship and/or capstone projects exposes students to real-world challenges they will face during their careers.

Sponsoring PSM internships and hiring PSM graduates makes sense for the employer's bottom line. For a small business, government agency or non-profit, the PSM intern can make cost-effective contributions to research and development projects. For those employers looking to hire, the internship can provide a vital opportunity to evaluate the stu-

It is the combination of collaboratively developed curricula and the requisite rigorous capstone and/or internships that enable PSM graduates to "hit the ground running" as new employees.

dent in a workplace setting. Given the employer costs in both time and money of training new hires, starting with a career-ready PSM graduate is a smart move. This has been demonstrated in PSM graduates hired by the authors as well as from discussions with area employers who state specifically that the PSM graduates are well-prepared upon arrival. It is the combination of collaboratively developed curricula and the requisite rigorous capstone and/or internships that enable PSM graduates to "hit the ground running" as new employees. The internship programs also provide a great way for potential employers and employees to "test drive" each other prior to full-time employment. This reduces the risk both employers and candidates take during the hiring and training process and is intended to ensure a

positive outcome for both.

PSM programs are only successful when they accomplish real engagement with the corporate and business communities, and employers can help facilitate connections. Employers can volunteer as advisory board members, guest lecturers, and mentors. These partnerships are the foundation of the various programs as they are a primary means through which they are continuously tailored academically to better meet industry needs. Opportunities for internships and employment can be shared with PSM students through their program directors. Human resources departments can be encouraged to include master's degrees, and the PSM specifically, in job descriptions where appropriate. Employers and students can find a nearby PSM program by using the PSM Program Locator<sup>2</sup>.

For an adequate PSM response to ever-growing STEM workforce demands, the PSM initiative must expand and become more well known. Leadership from corporations, industries, government and non-profits can encourage universities to either initiate or expand PSM degree programs. They can urge financial support for PSM students at the corporate, state and federal levels so even more students and employers can take advantage of this innovative and successful program.

In our personal experience, the return on investment in partnering with academic institutions to develop specific curricula, hosting PSM interns, and hiring PSM graduates has been very positive. Through sustaining partnerships with employers, PSM programs nationally will continue to fill the candidate pipeline with highly trained technical employees who will make an immediate, positive impact on an organization.

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- <sup>2</sup> <https://www.professionalsciencemasters.org/program-locator>
- <sup>3</sup> [https://www.professionalsciencemasters.org/sites/default/files/the\\_innovator\\_curated\\_issues\\_fall\\_2017\\_vol\\_10\\_issue\\_3.pdf](https://www.professionalsciencemasters.org/sites/default/files/the_innovator_curated_issues_fall_2017_vol_10_issue_3.pdf)

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