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# Results of a Preliminary Survey on Graduate Training in Professional Skills

BY ALLISON MILLER AND MELBOURNE BRISCOE

## INTRODUCTION

Informal discussions suggest the need to understand which professional skills are taught<sup>1</sup> in ocean science graduate schools and which are perceived as needed in the workplace by employers and by employees who are in the first five years of their professional careers (termed early-career employees). Is there any agreement among students, faculty, employers, and early-career employees on which skills are relevant to their careers, needed in the workplace, and taught well to students?

There are many “professional skills” and no clear granularity in how detailed such a list needs to be. An example list of skills can be found on the American Association for the Advancement of Science (AAAS) Science Careers website (<http://myidp.sciencecareers.org>). Because our survey was preliminary, we listed eight skills covering the spectrum of training and professions. Seven of the skills in our survey were part of or paraphrase the AAAS MyIDP list, and the eighth was “community outreach”—quite non-traditional but increasingly valued

in the workplace. The eight skills used in our survey were:

- Research
- Teaching
- Technical Writing
- Project Management
- Non-Technical Writing
- Non-Technical Oral Communications
- Community Outreach
- How to Review a Proposal

The Web-based survey was sent to members of the Consortium for Ocean Leadership, with requests to distribute to students, faculty, employers, and early-career employees. We received 342 responses from 64 different organizations, with input from 143 graduate students, 121 graduate faculty, 73 employers (61 academic, 11 nonacademic), and 64 early-career employees (37 of these were in academia). Thus, the results are skewed toward an academic view.

The first part of the survey asked about valued professional skills. The second part sought information on whether those same skills were being taught, and if the training was adequate for an employee’s or employer’s needs. An example question in the first part of the survey was: “Choose the 4 most

important and the 4 least important skills for you to have if you pursue a career in academia.” The same basic question was asked of each of the four target groups and was asked about careers both in and outside of academia.

## RESULTS

The results provided by all four target groups were synthesized to provide one summary assessment of the perceived relative importance of eight professional skills for a career in academia. The vertical axis in Figure 1 is the combined responses of the employers and early-career employees; the horizontal axis is the combined response of the students and faculty. Note that the rankings are relative; all eight skills might have been thought to be valuable, but the questions forced responders to prioritize.

Figure 1 shows agreement among all responding groups with respect to most important skills (upper left quadrant) and least important skills (lower right quadrant). The remaining quadrants represent disagreement: (upper right quadrant) students and faculty think “non-technical oral communication” and “proposal review” are two of the four least important skills, but the employees and employers disagree; (lower left

<sup>1</sup> Here, “taught” includes all types of learning—not just formal classroom activities. Mentoring and informal methods of gaining professional skills are meant to be included.

quadrant) students and faculty think “teaching” is one of the four most important skills, but the employees and employers disagree.

Figure 2 shows the same assessment for a career *not* in academia. It is identical to Figure 1, except all reporting groups agree that “teaching” is a less important skill (it has moved to the lower right quadrant) and that “non-technical oral communication” is a more important skill (it has moved to the upper left quadrant). To summarize, for careers *not* in academia, all reporting groups agree on the four most important professional skills and on three of the least important skills. Only “proposal review” is highly valued by employees and employers, but not by students and faculty.

In the second part of the survey, when students were asked whether the eight professional skills are being taught in their graduate programs, the four most highly valued skills (see Figure 1) are not the four skills most taught. Project management<sup>2</sup> stands out as one of the most important skills, but is taught in just 20% of the programs (Figure 3).

The employee and employer questions were aimed at their perceptions of which skills are lacking in the early-career employees. According to employers, the skills most lacking are “technical writing” and “project management.” The latter is no surprise; student and faculty results also show the topic is not really taught. The former, however, is a

<sup>2</sup>“Project management” has a variety of meanings, ranging from a single PI with a single grant proposal to large engineering-oriented projects with many employees and funded by a contract with multiple oversight and reporting requirements. This spectrum of meanings needs clarification in future surveys. In this survey, we give program development and program evaluation as examples of “project management.”

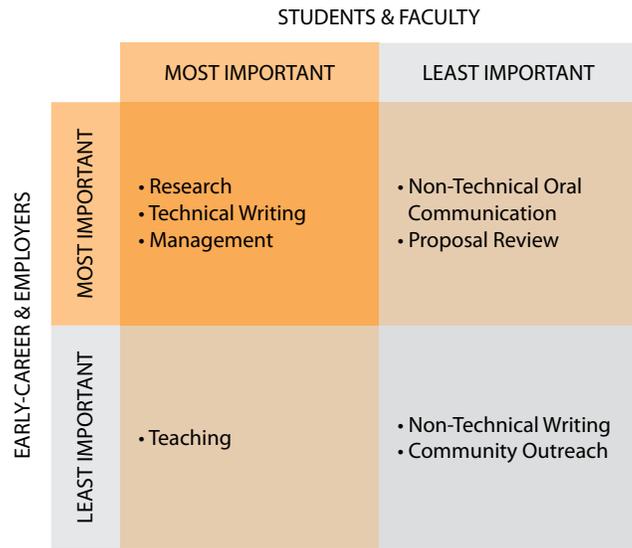


Figure 1. Summary assessment of most and least important skills for a career in academia.

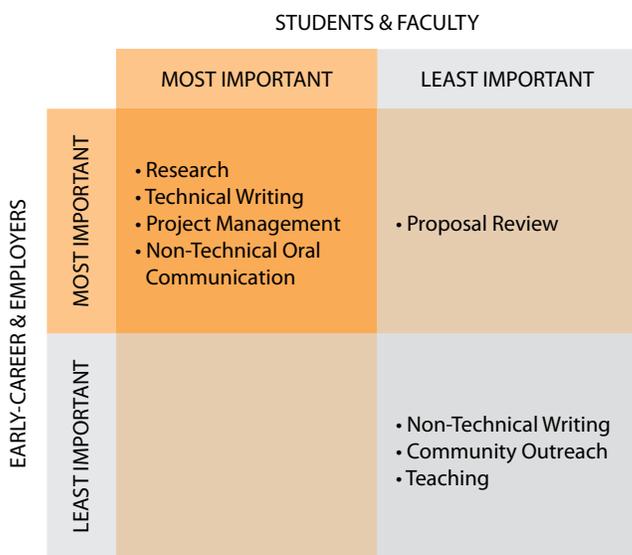


Figure 2. Summary assessment of most and least important skills for a career *not* in academia.

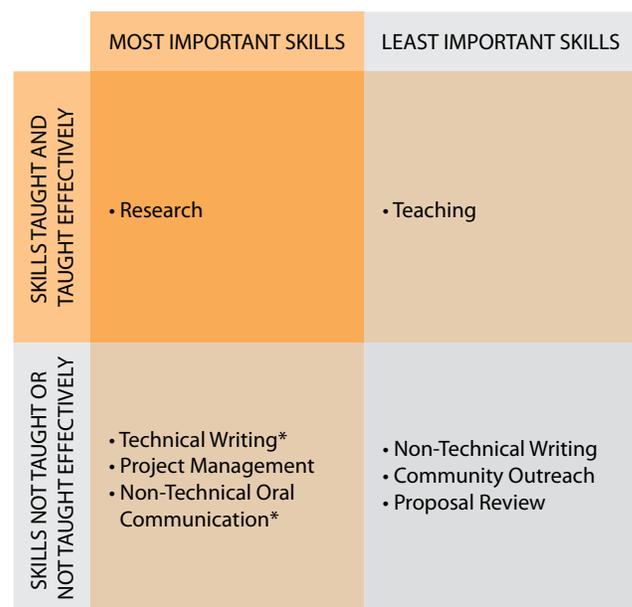


Figure 3. Combined assessment of most/least important skills and what is taught or not taught effectively in graduate school, for careers *not* in academia. \*Indicates skills taught but not taught effectively.

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surprise; results show it is taught in 78% of the cases, but evidently is not taught well enough to satisfy the needs of the employers. Figure 3 shows these results. (Note that most of the employers are in academia, and half the employees are in academia so this result is academic-weighted.) The horizontal axis displays the most/least important skills, and the vertical axis places the skills taught and taught effectively (i.e., not lacking) in the top half, while those skills not taught or not taught effectively (i.e., lacking) are in the bottom half.

In summary, only “research” is perceived as important, taught, and taught effectively (upper left quadrant). “Teaching” is perceived as one of the least important skills according to the early-career employees and employers, but is taught well to the students (upper right quadrant). Three skills (lower right quadrant) are perceived as less important and are not taught much in the graduate schools. Another three skills (lower left quadrant) are deemed to be more important, but are not taught (project management) or are lacking in the graduates (“technical writing” and “non-technical oral communication”).

## CONCLUSIONS

Although this survey is preliminary, the results highlight the perception of valued and lacking skills in today's professional arena and where those perceptions vary

among four different groups. Austin and Alberts (2012) argue in a *Science* paper that current academic training is not taking into account all the needs of its students, even those going into academia. Additionally, Rosenberg (2012) suggests that “there is a huge disconnect between how we currently train scientists and the actual employment opportunities available to them.” He was specifically speaking of the biomedical field, but the statement can be extended to other fields.

More attention in graduate programs should be given to project management and proposal review. Both of these skills were ranked as important by employees in the first five years of their careers and by the employers who hire and oversee them, yet they were ranked by students and faculty as not taught. Additionally, more effective attention could be given by graduate schools to technical writing skills and non-technical communication skills, as these were labeled as relatively important, but were not taught or not being taught effectively.

The results presented here are dependent on the population surveyed (academic-heavy here) and the skills chosen to survey. Following the Ocean Science Educators' Retreat in September 2012, a small working group was put together to improve the survey for future efforts; the follow-on survey should enhance the population queried and fine-tune the list of needed skills. 

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