

Benefits of One-on One Resume Advising for Undergraduate Engineering Students Participating in a Summer Research Program

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Abstract

Whether they choose to pursue graduate school or employment, many rising college seniors are faced with completing applications for post-graduation experiences. A resume is an essential component of these applications, and in an effort to support students in creating strong resumes we developed (1) a professional development seminar and (2) an advising intervention. These resume development activities were deployed during a ten-week engineering summer research program serving more than 90 undergraduates at Michigan State University. A subset of 26 rising seniors was identified from the summer program as the treatment group for this project. The “initial” resumes that these students submitted as part of their application to the summer program were evaluated, and the 13 students with the lowest scores were invited to participate in a thirty-minute, one-on-one advising session. 11 students participated in these advising sessions, and then all 90 students in the summer research program participated in a ninety-minute professional development seminar focused on creating effective academic resumes. Students submitted “revised” resumes after the seminar, and comparing the “initial” and “revised” documents indicated that while most students’ resumes improved over time, there was a stronger improvement in the treatment group (who received individual advising).

Introduction

Developing an effective resume is essential for students transitioning from undergraduate programs to the workplace or graduate school. Prior research has indicated that providing engineering students with guidance on developing strong resumes can support the development of personal identity [1] as engineers and encourage career planning [2]. Yet the most common type of resume support provided to undergraduate engineering students is through career advising centers, which frequently focus on providing routine advice about the formatting and content of “typical” resumes for recently-graduated engineers [3]. Undergraduate research programs and experiences often provide a broader lesson in developing resumes that are appropriate for graduate school and graduate fellowship applications [4]. These types of specialized support can be particularly helpful for first-generation college students [5] and those from populations historically underrepresented in STEM (science, technology, engineering, mathematics) [6].

Overview of Summer Research Program

The Engineering Summer Undergraduate Research Experience (EnSURE) program is hosted at Michigan State University. EnSURE engages undergraduates in 10-weeks of full-time, mentored research with faculty in ten engineering disciplines. EnSURE is a program for high-achieving undergraduates, with a 3.20 minimum GPA required of applicants. Every student is paired with a faculty mentor, and most work in research groups or laboratories that include a variety of faculty, postdoctoral researchers, graduate students, and undergraduate research assistants. EnSURE

participants are expected to work full time (40 hours/week) on research during the 10-week program, and are compensated at an hourly rate.

In addition to students' research activities, they are required to participate in weekly professional development seminars and complete a number of writing assignments. Figure 1 summarizes the calendar of activities and assignments for EnSURE students. Previous research and program evaluation data have demonstrated that students find the EnSURE experience helpful for clarifying their educational and career goals, preparing for graduate programs, and developing research skills and applying knowledge outside of the classroom [7]–[10].

Resume Evaluation Methodology

As part of the EnSURE application process, students were required to submit resumes – but were given no specifications for the content, format, or length of these documents. Thus, the resumes included with students' applications varied greatly: some were lengthy, with multiple pages and detailed bullet points on numerous activities; other resumes were extremely brief, covering barely a single page and listing few details about past experiences. As part of the summer research program, all EnSURE students participate in a 90-minute seminar about developing effective resumes in week 8 of the 10-week program.

Several weeks prior to this seminar, the resumes of 26 rising seniors (students participating in EnSURE during the summer prior to their 4th or 5th year of college) were identified among the application materials. These 26 students were identified as the target group for two reasons. First, as rising seniors it was presumed that students would have both sufficient experience to fill out a resume and hopefully the motivation to do so given their impending graduation dates. Second, these students had all completed the appropriate research participation and release documents allowing us to use their data as part of a larger research project, of which this resume intervention is a component. Students were told completing the research participation and release documents were completely voluntary and any information gained from their data would be used to support and improve future students' experiences.

The “initial” resumes from the application materials for these 26 rising seniors were scored from 0 to 5 according to the following points:

- 1 point if the resume included information about the student's educational background
- 1 point if the resume focused exclusively on post high school experiences
- 1 point if the resume did not include a separate objective section
- 1 point if the resume was less than two pages and divided into understandable sections
- 1 point if the resume bullet points offered details on why student's work was important, how they performed tasks, and/or the student's impact on the task or project

These points were selected based on both previous research and the assumption that students would eventually be using their resumes as part of larger applications. Past research and practice related to resume writing skills among undergraduates has demonstrated that effective resumes include educational background and details on past experiences, and are coherently formatted



When	Why	What's Due
Monday, May 23	First day of full-time research activities through EnSURE	
Wednesday, May 25 9:00am – 10:30am	Seminar: Program Orientation	
Wednesday, June 1 9:00am – 10:30am	Seminar: Tools and Techniques for Literature Reviews	<ul style="list-style-type: none"> • Mentor-Mentee Contract • Research Report #1
Wednesday, June 8 9:00am – 10:30am	Seminar: Developing Your Abstract and Research Paper	<ul style="list-style-type: none"> • Research Report #2
Wednesday, June 15 9:00am – 10:30am	Seminar: Developing Effective Research Poster Presentations	<ul style="list-style-type: none"> • Poster Abstract Draft • Research Report #3
Wednesday, June 15 11:30am – 1:00pm	Networking Lunch: Life as a Graduate Student	
Wednesday, June 22 9:00am – 10:30am	Seminar: Responsible Conduct of Research	<ul style="list-style-type: none"> • Annotated Bibliography • Research Report #4
Wednesday, June 29 9:00am – 10:30am	Seminar: Career Options for Graduate Degree Recipients	<ul style="list-style-type: none"> • Research Report #5
Wednesday, June 29 11:30am – 1:00pm	Networking Lunch: Life as a Faculty Member	
Wednesday, July 6 9:00am – 10:30am	Seminar: Overview of Graduate Programs & Application Processes	<ul style="list-style-type: none"> • Research Paper Outline • Research Report #6
Monday, July 11	Mid-SURE Online Registration	<ul style="list-style-type: none"> • Poster Title & Abstract
Wednesday, July 13 9:00am – 10:30am	Seminar: Academic Resumes	<ul style="list-style-type: none"> • Grad App Statement • Research Report #7
Wednesday, July 20 9:00am – 10:30am	Seminar: Leveraging your Undergrad Research Experience	<ul style="list-style-type: none"> • Final Research Poster • Academic Resume • Research Report #8
Wednesday, July 27 12:00pm – 4:00pm	Mid-SURE Symposium on Undergraduate Research Experiences	
Friday, July 29 11:30am – 1:00pm	Last day of EnSURE Program	<ul style="list-style-type: none"> • Final Research Paper • Research Report #9 • Research Report #10

Figure 1: EnSURE Program Calendar and Writing Assignments

[11], [12]. High school experiences are generally inappropriate for a resume used for a graduate school or job application; the resume should focus instead on students’ college and professional experiences. Since these resumes are intended for inclusion with a graduate school admission or fellowship application, the objective section can be excluded as well.

Table 1 summarizes the demographics and “initial” resume scores for the 26 students identified as participants in this project. Demographics are provided here to illustrate that there were a variety of students involved in this study, including students of different genders, ethnicities, and domestic or international status.

After scoring the “initial” resumes, the 13 students with the lowest scores were invited to a 30-minute, one-on-one advising session with a graduate student from the Student Affairs program at Michigan State University, who had prior experience as a college career adviser and had completed a practicum experience with the EnSURE program coordinator. The agenda for each of these 30-minute advising sessions varied somewhat based on individual students’ questions, but generally included the following topics:

- Creating effective resume bullet points
- Quantifying impact on projects
- Skills gained from past research, work, classroom, or volunteer experience

Table 1: Demographic Information for Study Participants

Student	Gender	Ethnicity	Domestic or International	“Initial” Resume Score
1	Male	White	Domestic	3
2	Male	White	Domestic	2
3	Female	Asian	Domestic	4
4	Male	White	Domestic	3
5	Male	Asian	International	2
6	Female	White	Domestic	5
7	Female	White	Domestic	3
8	Male	White	Domestic	3
9	Male	White	Domestic	3
10	Male	White	Domestic	2
11	Male	Asian	International	2
12	Female	White	Domestic	3
13	Male	White	Domestic	4
14	Male	White	Domestic	3
15	Female	White	International	3
16	Male	Black	International	3
17	Male	White	Domestic	3
18	Female	Hispanic	Domestic	4
19	Male	White	Domestic	4
20	Male	Asian	International	2
21	Female	Asian	International	4
22	Male	Asian	International	2
23	Female	Other	Domestic	3
24	Male	White	Domestic	3
25	Female	White	Domestic	2

26	Female	Asian	International	5
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11 of the 13 invited students chose to participate in the individual advising sessions. Students were provided with a copy of the resume that they had submitted to the EnSURE program when they arrived at the advising session. Advising meetings were held in conference rooms within the engineering building where the EnSURE program seminars were located, and were generally scheduled for after the seminar to make it simpler for the students to participate in the interviews if they wished.

Qualitative Results from the One-on-One Advising Sessions

The adviser who conducted the one-on-one sessions with the selected students took notes during and after the meetings and reviewed them to determine common themes from these discussions:

- Privacy
- Bullet point length
- Creating a perfect bullet point

Since all of the students participating in the summer research program had an opportunity to work with professors and graduate students on research projects, many chose to include the new experience on their resumes. However, several students were concerned about sharing too much about the research. Students did not want to violate their research mentors' privacy or intellectual property rights so they were hesitant to include too many details. The adviser encouraged these students to focus less on the content of the research and more on the lab or technical skills they were gaining by participating in a research project.

For example, a student working on a biomedical research project came to the advising appointment struggling to determine how much information to share about the project on the resume. When asked to describe some of the specific skills that the student was learning, the student described working with an LED driver/microcontroller and created the following bullet point to showcase this experience:

“Initiated the design and programming of an LED driver/microcontroller circuit to precisely control the light output of micro-LEDs, and to implement dynamic stimulation protocols.”

Other students knew they had to be succinct in their resumes and were therefore concerned that adding more information about the skills they gained or the impact of their work would make their resumes too long. These students were asked to first brainstorm what they wanted to add, and then think through the briefest way they could include the information. For example, one student developed the following bullet point to highlight several chemistry techniques that the student was now capable of performing:

“Analyzed and quantified results through analytical chemistry techniques such as HPLC, GC-MS, and NMR.”

The advisor and the students engaged in discussions about how to include some details, such as skills gained, from each experience so the reader would understand the transferable skills even if the specific details of the project could not be shared for reasons of privacy or brevity.

Finally, there were students who believed there must be only one “perfect” way to create a bullet point. While there may be tips, tricks, and best practices for building effective resumes, many choices are left up to the writer. During these advising sessions, students were encouraged to focus less on creating perfect bullet points and more on writing a resume that clearly reflected their abilities, interests and experiences.

Overview of the Resume Development Seminar

After the one-on-one resume advising sessions were complete, all 90 students in the EnSURE program participated in a 90-minute seminar on creating effective resumes. The one-on-one resume advising sessions were conducted before the seminar in large part due to timing. The resume seminar was not scheduled until later in the summer, therefore the weeks leading up to the seminar were used to reach out to student participants and conduct one-on-one advising sessions. Key topics covered in the seminar included:

- Creating different resumes for different purposes
- Formatting for an academic resume
- Appropriate content for an academic resume
- Adding details to bullet points

Example slides from the resume seminar showing how students were encouraged to create detailed bullet points are included in Figure 2 and Figure 3.

The seminar included numerous examples and students were asked to bring copies of their own resumes so they could participate in peer review activities. During the seminar, students were provided with information on resume formatting and content. Students were encouraged to format their resumes with distinct, easy to understand sections and stay within a two page limit unless they had extensive relevant experiences to include. Since many of the students’ resumes would be used as part of a larger graduate school application or included with a cover letter as part of a job application, students were told not to include a resume objective. In terms of content, students were encouraged to focus on post-high school experiences, to share information about their college educational background, and to create detailed bullet points. Bullet point details were to include information about how students performed tasks and the skills they gained, why the work they performed was important, and/or the impact of their work on a project or experience. All students, both those who engaged in one-on-one advising and those who did not, were included since seminar participation was required as part of the EnSURE program.

Describing Research/Professional Experience

- Describe WHAT you did then add additional details about
 - **How** you performed a task
 - **Why** you performed a task
 - The **Impact** of your work

Figure 2: Example Slide from Resume Professional Development Seminar

Bullet Point Example: Emphasize *Impact*

- Generic Bullet Point
“Used a force plate and high-speed camera system”

- Emphasize **Impact**
“Used a force plate and high-speed camera system **to collect gait data from 12 different subjects**”
 - Consider your contribution
 - Excellent opportunity to quantify

Figure 3: Example Slide from Resume Professional Development Seminar

Quantitative Results from the “Revised” Resumes and Program Feedback Forms

Following the 90-minute resume seminar all students, including both those who did and did not receive individual resume advising, were asked to submit a new resume. Of the 26 rising seniors who were identified as participants in this study, 22 submitted revised resumes – including 9 of the 11 students who accepted invitations to participate in one-on-one resume advising sessions. The revised resumes were evaluated using the same 5-point scale that was used to score the initial resumes. Table 2 summarizes the “initial” and “revised” resume scores for all 26 students, noting which students were invited to one-on-one advising sessions and which students chose to participate.

Table 2: Summary of Changes in Resume Scores by Treatment Group

Student	Treatment Group	“Initial” Resume Score	“Revised” Resume Score	Change
2	Advised	2	5	3
10	Advised	2	5	3
5	Advised	2	5	3
7	Advised	3	5	2
20	Advised	2	4	2
15	Advised	3	5	2
1	Advised	3	5	2
17	Advised	3	4	1
22	Advised	2	3	1
18	Not Advised	3	5	2
23	Not Advised	3	5	2
14	Not Advised	3	5	2
24	Not Advised	3	5	2
25	Not Advised**	2	4	2
3	Not Advised	4	5	1
13	Not Advised	4	5	1
19	Not Advised	4	5	1
16	Not Advised	3	4	1
21	Not Advised	4	5	1
9	Not Advised	3	3	0
11	Not Advised**	2	2	0
26	Not Advised	5	4	-1
12	Advised	3	Did Not Submit	n/a
4	Advised	3	Did Not Submit	n/a
6	Not Advised	5	Did Not Submit	n/a
8	Not Advised	3	Did Not Submit	n/a
** student was invited to participate in advising session, but declined				

All 9 of the students who received individual advising improved on the 5-point scale. In 5 of the 9 cases, students improved their resumes so much that they addressed every aspect of the 5-point scale. In most cases, the rising seniors who did not receive individual resume advising, but who did submit a new resume following the group seminar, also improved on the 5-point scale. Interestingly, there was one instance of a student who did not receive one-on-one advising

submitting a new resume that was weaker on the 5-point scale than the initial resume, although this student was one who initially started with a high resume score.

At the conclusion of the EnSURE program, students were asked to complete an exit survey to provide feedback about their experiences. Although the seminar and advising sessions about resumes were not included in the survey questions, several students left feedback about these learning opportunities in response to open-ended questions about the “best” or most helpful components of the program.

Concluding Discussion and Future Work

Resume development activities are a common – and valuable – component of undergraduate engineering experiences. The key differences to the approach described here include: (1) the resume development activities focused on rising seniors participating in an intensive undergraduate research program; (2) this project focused on helping students to prepare **academic** resumes that would be appropriate to include in graduate school applications. Comparing “initial” and “revised” resumes for students who participated in the resume development seminar – but not the one-on-one advising sessions – indicates that the seminar alone may have had a positive impact on the content and quality of students’ resumes. The addition of an individual advising intervention was helpful to the students who participated in one-on-one advising.

In the short term, the graduate student who designed and implemented this project will apply the lessons learned to a newly-acquired role as an undergraduate academic advisor in the College of Engineering at Michigan State University. In the longer-term, this project will inform the ongoing refinement of the EnSURE professional development seminars to better address students’ concerns about which “rules” to follow in order to develop the “perfect” resume.

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