

The Missing Link – Tool #4: Knowing Your Skills

In order to stand out among a pool of applicants, you must be able to accurately and competitively represent yourself on paper (in a resume and cover letter) and in person (in networking environments and in interviews). This means that you have to figure out who you are and what you know. Physics majors have a lot of unique knowledge and skills that are valuable in the job market. Your set of knowledge and skills develops over the course of your education in several ways:

- Successful completion of introductory and advanced theoretical courses
- Successful completion of introductory and advanced lab courses
- Successful completion of an internship or research experience
- Participation in extracurricular activities
- Participation in leadership roles

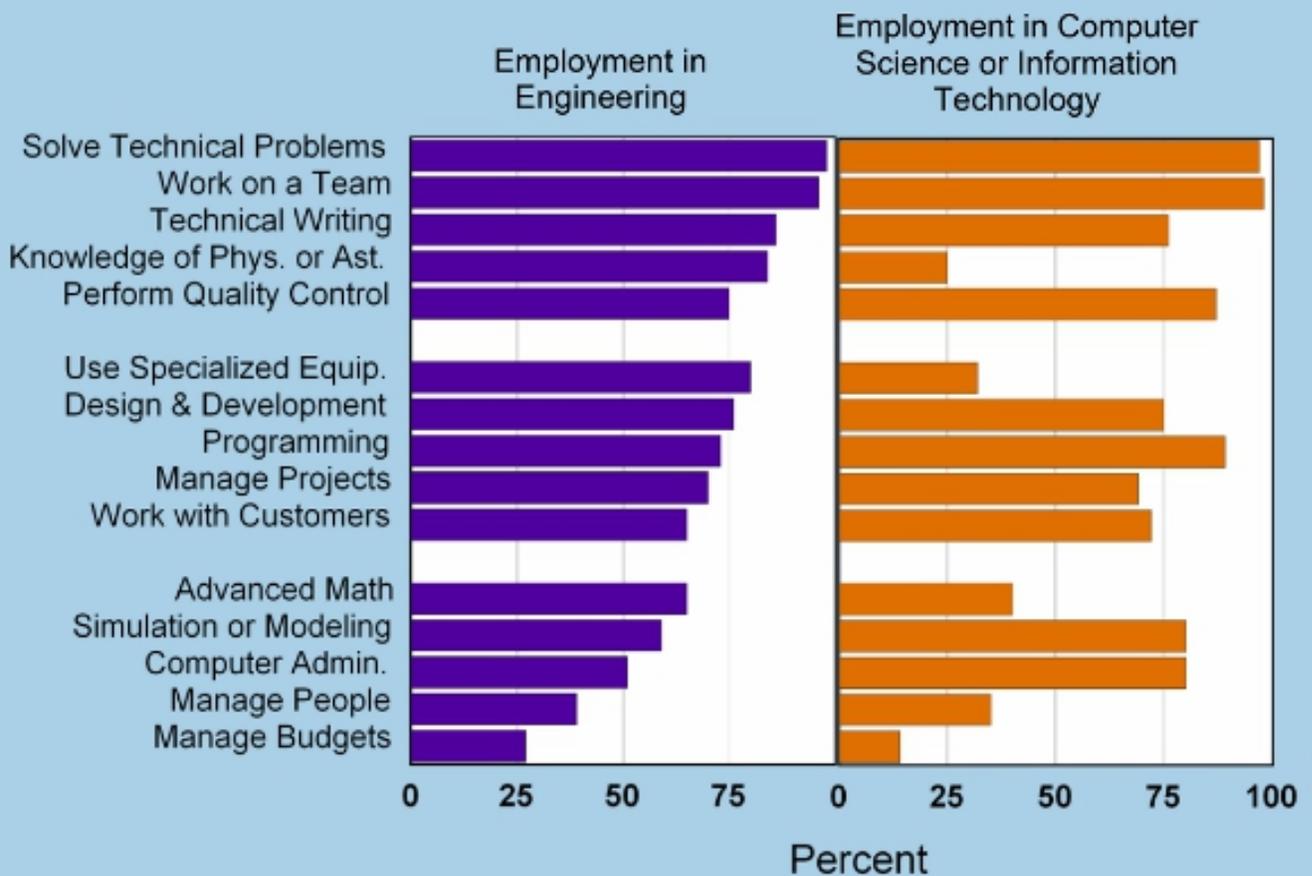
Each of these curricular or extracurricular components contributes something different to your set of knowledge and skills.

The graph on the following page represents a set of knowledge and skills that is regularly used by students who have graduated with a degree in physics, reported by the graduates themselves through an AIP Statistical Research Center survey of employed bachelor's degree recipients.³



TOOL #4 YOUR SKILLS

Knowledge and Skills Regularly Used by Physics Bachelor's Employed in the Private Sector, Classes of 2009 & 2010 Combined



Percentages represent the physics bachelor's who chose "daily", "weekly", or "monthly" on a four-point scale that also included "never or rarely".

<http://www.aip.org/statistics>

Figure 6: Recent data listing skills commonly used by physics bachelor's in the workplace.

Common Skills of Physics Students

The first step in assessing your skills is to consider broad categories of skills that physics students commonly develop and how to express them in language that is meaningful to employers. Below are several broad categories of skills that are developed through the experiences of a typical physics student (courses, labs, work, research, etc.).

Identifying, assessing, and writing down your skills can be time consuming but is one of the most efficient ways to increase the odds of landing a job that is a good fit for you. That is because these skills form the basis of your resume, cover letters, and interview talking points. By carefully examining your own experiences, you can extract your personal knowledge and skills and learn to express your capabilities in ways that are meaningful in the job application and interviewing process.

Skill: Working with laboratory instruments

one of the common features of programs studied in the career pathways project was the availability of varied and high-quality lab courses for undergraduates.

Students who are pursuing a major in physics often have a wide variety of lab experience. Virtually all physics curricula require students to take a lab with the introductory courses and as a part of a senior thesis or a capstone project. Some physics departments have labs during the 2nd and 3rd years as well. In addition, many students participate in research experiences that deal extensively with lab equipment. Through these experiences, students learn how to use a variety of different instruments (e.g., optical components, electronics, machine shop tools, vacuum systems, telescopes, spectrographs) and often develop skills related to their operation, maintenance, repair, quality control, and troubleshooting.

Skill: Conducting research

Many physics majors participate in open-ended research. This includes on-campus experiences with professors, off-campus research experiences (maybe as part of a Research Experience for Undergraduates program or an internship), working on an independent research project, or working on a project for a specific course. Research experiences engage students in higher-order skills and knowledge, including research design, data analysis, creative thinking, critical thinking, error analysis, and complex problem solving. An often overlooked skill developed through conducting research is the ability to find, read, analyze, and interpret relevant background information. This is useful in a wide variety of settings.

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Skill: Proficiency with computer hardware and software

Studying and conducting research in physics often provides opportunities for students to develop knowledge and skills in computer hardware and software. Many physics majors write new code or modify existing programs, use statistical analysis software, or use modeling, image processing, and simulation techniques for research activities. In addition, many students use programs like LabVIEW to run equipment and take data, or build specialized interfaces for this purpose.

Skill: Communicating complex ideas

One of the common features of programs studied in the Career Pathways Project was the inclusion of communication skills in the undergraduate physics curriculum.

All students are expected to develop good written and oral communication skills during their four years of college. Physics students are no exception, and they tend to have a lot of experience presenting complex information or ideas. Beyond the general education requirements, physics students usually develop enhanced **written communication skills** through writing technical lab reports and research papers that are part of the required curriculum. Physics students may also have the opportunity to publish research work in a professional journal or to write about science for a nontechnical audience, e.g., a school newspaper. **Oral communication skills** are developed when students have to present their research/class work in an oral presentation, another common experience for physics students. Students in physics often further develop these skills through

regular presentations to a research group or as part of a journal club. Many students also attend regional or national professional meetings where they present research findings.

Skill: Analysis and quantitative thinking

Physics students have a demonstrated ability to apply math to a variety of real world problems. When seeking employment in a STEM field, this is especially important. Employers value the analytical skills that help people manage information effectively, think logically, and interpret data. The ability to analyze quantitative data helps in examining a problem thoroughly and seeking possible solutions. The quantitative physics intuition students possess is developed over years of physics coursework and endless hours of homework. Related to this, the ability to analyze information and determine what is and is not relevant is developed over years of lab work and problem solving.

Skill: Working with others

Many students are members of a research team, are active in campus organizations like the Society of Physics Students, and have extensive experience with group projects. Do not underestimate the importance of these experiences and skills. Teamwork, collaboration, leadership, and decision making are important skills to employers that are evidenced by examples of effective group work. Working with others is often one of the most challenging aspects of a job.

Skill: Problem solving and critical thinking

Underlying many of these other skills is the ability to solve problems—the ability to examine a situation, identify problems, and think creatively about a solution. Physics students do this again and again in labs, research, and homework. They learn how to find solutions through literature searches, online searches, collaborating with colleagues, experiments, and reasoning. This skill is incredibly valuable to all types of employers, because problem solvers save employers time and money.

Summary: Commonly used skills

physics bachelor's degree holders in the workplace

- ⇒ Communicating complex ideas
- ⇒ Analysis and quantitative thinking
- ⇒ Working with others
- ⇒ Problem solving and critical thinking
- ⇒ Working with laboratory instruments
- ⇒ Conducting research
- ⇒ Proficiency with computer hardware and software

Important notes about this list

Each entry on this short list should be considered as a “set” of skills. You may have several specific skills that fall into a particular skill set ‘category’. Also note that this list is not exhaustive. There are a number of other important skills that you might possess and that may be useful to a potential employer. This list represents data obtained by surveying physics bachelor’s degree holders who have entered the workplace, and should be considered as a starting point.

Exercise - Tool #4 – Part 1: Assessing Your Skills – Brainstorming your experiences

⇒ The first step is to list your experiences that may have some relevance in a job. Start broadly. You might think of all the science courses you have taken, laboratory courses that you have taken, any work experience (whether paid or volunteer), leadership experiences, events sponsored by organizations in which you have been actively involved...and many others.

My Experiences

My classes / training / workshops/ tutorials	My leadership experiences/group activities/ professional associations
My jobs: research experiences, internships, volunteer work	My hobbies and other activities

Exercise - Tool #4 – Part 2: Assessing Your Skills – Identifying skill sets from your experiences

- ⇒ Next, think about those experiences as you review the list of skills (from the commonly used skills, page). Think about which skills you may have acquired as part of a particular experience. For example, many lab courses require group work, so this falls under the “working with others” skill. Most of your experiences will have provided you the opportunity to acquire multiple skills.
- ⇒ Identify skill categories which appear prevalently among your collection of experiences. For example, if much of your coursework, lab work, and your summer research involved computation, “proficiency with computer hardware and software” might be a good place to start.
- ⇒ Write the skill set category that you have identified at the top one of the pages labeled “Identifying My Skills – An Assessment Worksheet”
- ⇒ You are now ready to begin using the worksheet to flesh out the specific details about the particular skills in that category. Follow the “Skills Assessment Activity Guidelines” (below). These guidelines will take you through a simple process to refine your experiences and identified skills into polished statements ready for your resume, cover letter, or interview question answer.
- ⇒ Note: You may need to repeat this process several times, until you have a well-honed bullet point list of 8–12 unique skills. Again, you may have several specific skills that fall into a single skill set category. For example, you may have several unique skills related to “use of laboratory instruments”.
- ⇒ Make extra copies of the pages entitled “Identifying My Skills – An Assessment Worksheet”, since you will want to reiterate this process as you grow professionally, have new experiences, and attain new skills.
- ⇒ After completing several skills identification worksheets, summarize your bullet points and stories on the page labeled “My Skills Summary.” These summaries will be invaluable when you sit down to write your resume, write cover letters, and prepare for interviews.

Skills Assessment Activity Guidelines

1

Carefully examine your experiences. Identify one of the commonly used skills that appears in your experiences. Write this skill at the top of the "Identifying My Skills" page:

- ⇒ working with laboratory equipment
- ⇒ conducting research
- ⇒ communicating complex ideas
- ⇒ proficiency with computer hardware and software
- ⇒ analysis and quantitative thinking
- ⇒ working with others
- ⇒ problem solving
- ⇒ critical thinking

2

Back to the brainstormed list of experiences.

- ⇒ Now, regroup.
- ⇒ Use your list to write down all your experiences related to the skill. Include all the experiences that contribute to the development of this skill.
- ⇒ Consider classes, REU or internship experiences, summer jobs, teaching or research assistant experiences, club activities, outreach experiences, related hobbies.

3

Narrow it down. Draft a bullet point related to this skill like one you might use on a resume

- ⇒ Keep this short and to the point

4

Refine the language.

Refine your bullet point, focusing on *what you know how to do* and *how well you know how to do it*. You may want to do a few drafts and get feedback from others on which is most clear, concise, and meaningful.

Wording suggestions: Made measurements, took data, built, assembled, interfaced, performed troubleshooting, maintained, repaired, designed, calibrated, trained others, taught, investigated, wrote, organized, led, provided support for, managed, coordinated, analyzed, presented, modeled, processed, constructed, oversaw, simulated, modified, collaborated with, solved, experimented with...

Tips on explaining how well you know how to do something: Words like expert and proficient are vague and do not tell employers very much. Instead, describe your experience quantitatively or give evidence of your expertise. Possible quantitative descriptors: several times over the course of a semester, daily during the internship, x hours, x times... Possible evidence of expertise: trained colleagues, taught introductory students, published a paper...

5

Tell it.

Write down a few specific anecdotes that demonstrate your experiences related to this skill.

Go back to your experiences: Write down **specific** examples that demonstrate **how** you made use of this skill or how you attained it. **Think** about how these examples might help you answer some of the common behavioral interview questions.

Identifying My Skills – An Assessment Worksheet

Skill category: _____

Back to my brainstorming: Reorganizing my experiences related to this skill category

Tell it: Draft a bullet point related to this skill

Refine the language: Refine your bullet point, focusing on *what you know how to do* and *how well you know how to do it*. You may want to do a few drafts and get feedback from others on which is most clear, concise, and meaningful.

Show it: Write down a few anecdotes that demonstrate your experiences related to this skill

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Show it: Write down a few anecdotes that demonstrate your experiences related to this skill

⇒ List your “Show it” stories below
