



# Early College Folio

Unconventional Paths to College Education

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## Review

### *Teaching STEM to First Generation College Students: A Guidebook for Faculty and Future Faculty*

by Gail Horowitz

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Jessica S. Robbins, PhD  
Bard Academy and Bard College at Simon's Rock

*Teaching STEM to First Generation College Students: A Guidebook for Faculty and Future Faculty* by Dr. Gail Horowitz is a concise and informative guide for those who teach and mentor first-generation college students, from teaching assistants to PhD advisors. First-generation college students, who are the first in their family to attend college, face unique challenges, and this book offers practical strategies to promote their success and engagement in science, technology, engineering, and mathematics (STEM) courses. Although the book focuses on the STEM fields, many of the strategies for reaching these students both inside and outside of the classroom could be used by teachers of all subjects.

Dr. Horowitz holds a master's degree in chemistry and a PhD in science education. She has taught chemistry to high school, college, and early college students at both public and private institutions. Her experience with students from many different backgrounds is clear in her pragmatic advice and the pertinent stories that she shares from her years of teaching. The writing is concise (something I appreciate as a scientist!) and the book is well-organized with clear headings and subsections, making it one I could imagine myself going back to as a reference as I am preparing my courses.

The book begins with an overview of the experiences of first-generation college students. Dr. Horowitz highlights that first-generation college students tend to be hard-working and resilient. However, because they are more likely to come from lower socioeconomic classes, they may not be as academically prepared for college-level classes as peers coming from wealthier school districts. In many cases, these students feel like imposters in a higher education setting and try to keep as low a profile as possible in their classes so as not to be "exposed" as a fake. One point that really spoke to me was that the behaviors of first-generation students, such as avoiding class participation, not attending

office hours, and missing assignments, can read as laziness to the instructor, but are actually born out of fear of failure, not a lack of effort. When we understand the reason for students' behaviors, we can be more forgiving.

The book offers concrete, research-based examples of changes you can make to your classes to make them more accessible to first-generation students. As a seasoned instructor, Dr. Horowitz is mindful of making suggestions that are simple to implement and do not require an entire course redesign. For example, the sense of being an outsider makes first-generation students hesitant to ask questions in front of the class. By requiring students to write down and submit questions anonymously at the end of a class, these students are more likely to feel comfortable asking for clarification. One tweak I am going to make to my classes involves having students solve problems on the board. Usually I ask for volunteers to share their answers, but that leads to the very strong students being the only volunteers. This can make the other students feel even more inadequate because then it seems like everyone else "gets it." Dr. Horowitz suggests rather than calling students to the board or asking for volunteers, to have the students work out the problem in small groups and then send up a representative to the board. This way, all of the students are involved in the solving process and the work on the board belongs to a group, not an individual, thereby lowering the stakes.

There are chapters focused on strategies to use as an instructor, as a teaching assistant, as a mentor, and even one chapter speaking directly to the students. I appreciated that the book is full of practical advice and concrete examples, not just theory. On the other hand, when reading the book straight through, it feels repetitive as the author repeats advice aimed at different audiences. One idea she comes back to again and again is that teaching students how to study is crucial. The key, according to Dr. Horowitz, is to empower students to become "self-regulated learners"—or students with well-developed study skills. Although as college professors we may feel like our students should have learned to study long before they stepped foot in our classroom, the reality is that many students come to college with little experience of how to study for a rigorous course. Incorporating lessons on study skills into a class takes up time, but the payoff is worth it.

The book focuses on lecture-based classes and interactions with students in our offices. One area that could be expanded on more is how to support first-generation students in a laboratory setting. Students coming from underfunded schools most likely will not have had access to modern lab spaces and may be intimidated by the unfamiliar setting. I have found that labs, being three-hour time blocks, are often the spaces where I can have more informal interactions with students and connect with them on a more personal level. Once students are more comfortable "being themselves" around me, it is easier for them to be vulnerable and ask questions, and easier for me to get to the root of their confusion and explain topics in ways that are meaningful to them.

In my own classroom, one strategy I like to use to demystify the laboratory space is to assign lab partners each week, rather than letting students choose their own. This way students are exposed to the different styles of their peers and can learn from each other. It also allows me to make sure struggling students are not paired together. Another place where students struggle in labs is the writing of lab reports, which involves a strange and unfamiliar style of writing, very different from what is asked of students in an English or history class. Therefore, clear guidelines, scaffolding, and examples are important for helping students feel like they can tackle the assignments.

While the book is primarily focused on STEM education, many of the insights and strategies presented can be applied to a broader range of disciplines. The emphasis on cultivating a growth mindset, providing mentorship, and building a supportive community can benefit all educators, regardless of their field of expertise. Similarly, although the focus is on first-generation students, the strategies outlined in the book would benefit many of our students. Professors often bemoan the fact that students aren't coming to college with the same amount of preparation and knowledge about how institutions of higher learning work. I often have students tell me that they never had to study in high school, so coming to Simon's Rock is a shock to the system and they flounder when the material doesn't immediately click. Being intentional with our curriculum, using the suggestions Dr. Horowitz outlines paired with our own experiences and teaching instincts, benefits students of all backgrounds, be they first generation, early college, non-traditional age, or any other experience or identity.

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DR. JESSICA S. ROBBINS is a faculty member in chemistry at Bard College at Simon's Rock. Her research involves the application of organic chemistry to polymer science in order to create novel environmentally friendly materials. She is passionate about making the chemical sciences accessible to all students.