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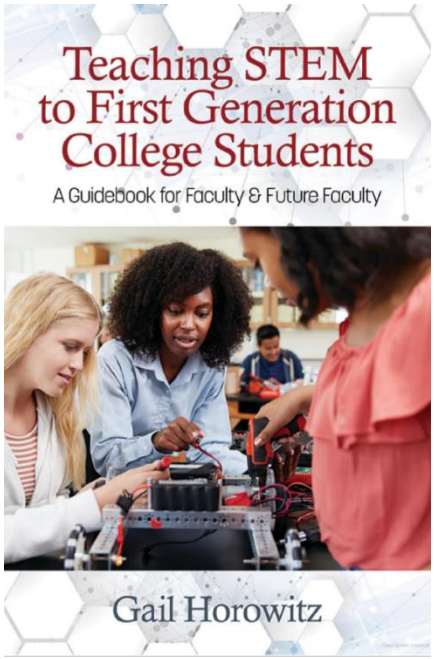
Reviewed by Syahrul Amin
Texas A&M University
United States



In *Teaching STEM to First Generation College Students*, Gail Horowitz challenges the widely acknowledged idea that aptitude is what makes students succeed in STEM at the college level. Instead, using quantitative and qualitative research, she boldly argues that "success in STEM at the college level is often in reality about the development of sophisticated study skills and not necessarily about aptitude (e.g., how smart you are, or how good science you are)" (p. 23). This notion raises questions about what kind of study skills could be the key to success for STEM students. By providing evidence-based guidelines and speaking from her own experience as a faculty teaching STEM subjects at CUNY-Brooklyn, she asserts that well-developed *self-regulated learning* (SRL) is the key to success for first-generation STEM students. According to Horowitz, instructors who use these practical guidelines need not worry about revamping their courses and teaching methods.

The book consists of nine chapters and a conclusion chapter. The first and second chapters of the book focus on multiple ways people perceive first-generation college students. Drawing from 30 years of teaching experience and varied sociological viewpoints and theoretical approaches, Horowitz persuades the readers to take a purposeful stance on how they

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frame first-generation college students. First-generation college students should be perceived by "the breadth, depth, and richness of experience that they bring to the classroom" (p. 16), not their deficiencies. In other words, instead of trying to fix students' shortcomings, instructors should help them strive by creating learning experiences that utilize rich and relevant experiences for them in the classroom. Furthermore, instructors should not overlook the significant value that first-generation college students bring into the classroom with their own unique perspectives.

The remaining chapters urge teachers to make a rigorous commitment to help first-generation students to succeed in STEM courses. Horowitz reiterates her pivotal thesis about self-regulated learning (SRL) and provides resources for current and future STEM faculty to incorporate this theory into their classrooms. Horowitz argues that aside from grading, giving frequent feedback is one way to incorporate SRL into the STEM classroom. For example, posting the answer key instantly right after an exam or quiz provides students immediate feedback regarding their work, and hence, enhances their abilities to become self-regulated learners.

Horowitz also addresses psychological factors that impact first-generation students' adoption of self-regulated learning (SRL) behaviors. The book showcases an in-depth analysis of the factors that might foster or hinder the development of SRL skills from the perspective of first-generation college students, parents, and their instructors. For instance, imposter syndrome impacts the development of SRL when first-generation college students try to conceal their struggles from others. By faking it, first-generation college students end up hiding, and not learning, from others, and avoiding risk at all costs. This behavior costs these students an opportunity to develop their SRL skills and sometimes they end up failing their STEM courses. To avoid unfavorable outcomes, STEM faculty should be aware of this and other factors that could potentially hinder the success of their first-generation students.

This notion that college student success in STEM is associated with study skills and not aptitude challenges prevalent myths about gifted students in STEM and opens opportunities for new perspectives on students with their learning difficulties in STEM courses. Instead of distinguishing between brighter students who may be more gifted in STEM and students who struggle in STEM courses, the author frames her SRL theory around the concept that all students can succeed in STEM courses regardless of their aptitude. As first-generation college students have higher attrition rates than other types of college students, this approach focused on increasing the retention rate of underrepresented groups in STEM aligns with wider efforts to broaden diversity within STEM.

Although the focus is on tips for current and future faculty, Horowitz also offers advice geared directly to undergraduate STEM students. She dedicates one chapter of the book to struggling STEM undergraduate

students, which she urges faculty to share with their students in order to help them figure out why they are struggling. If readers skip over this discussion of how undergraduates can become more effective self-regulated learners, they would miss the big picture of the book. This chapter is full of practical advice for first-generation undergraduate students on what they can do to heighten their self-efficacy in learning STEM. To share this chapter with students is an effortless way for college instructors to incorporate self-regulated learning into their classroom, as first-generation students are made more aware of these study skills in advance.

At a time when attention to and concern about first-generation college students in STEM disciplines is prevalent, Horowitz provides a fresh outlook: self-regulated learning abilities help first-generation students cope with their anxiety about STEM courses in college. This approach resonated with me as a first-generation college student. While the guidelines and advice that stem from self-regulated learning theory do not bring instant success, they can entice first-generation college students to gradually improve their study skills and learn to "assess everything they are doing and modify as needed" (p. 105).

Yet, Horowitz does not put forward what specific types of STEM faculty are encouraged to follow the guidelines in this book. Hence, the title of the book is somewhat misleading. As a guidebook for all faculty and future faculty, the author should have taken into account the workload of each faculty, the types of STEM discipline, and the undergraduate class size because these elements are the contributing factors to the successful implementation of SRL strategies. Even though the author argues that providing instructional process about self-regulated learning (SRL) should not take class time, I would venture to say that the author's argument is no longer compelling when it comes to a particularly large undergraduate STEM class, or a multi-faceted course taught by several different types of STEM faculty.

By overlooking faculty workload, types of courses in STEM disciplines, or STEM class size, the author diverts the attention of readers away from the definitive end of this book, the practicality of the book's guidelines for STEM disciplines. For instance, the author argues that the SLR works effectively in science courses. However, the author has yet to provide evidence-based arguments that SLR also works in the other disciplines (e.g., technology, engineering, and mathematics), and readers looking for this information will be disappointed.

Overall, I recommend this book to STEM faculty, particularly new STEM faculty, graduate teaching assistants in the STEM discipline, and for those interested in becoming STEM faculty in the future. New faculty who might not be well versed in the literature of the first-generation college students in STEM could employ the SRL strategies laid out by Horowitz

(e.g., looking into students' psychological factors). Graduate teaching assistants who are currently teaching STEM courses can use this text as a guide as they mentor struggling first-generation STEM students and acquaint themselves with first-generation students' strengths and weaknesses, particularly in their study skills.

About the Reviewer

Syahrul Amin is a Fulbright scholar who recently graduated from Texas A&M University with an MS degree in Curriculum & Instruction, and emphasis in science education. Currently he is a PhD student in the same program and is involved in various research and teaching opportunities at Texas A&M University. He believes that diversity can empower science education.