

# Precollege Profiles of High-Performing STEM Majors

Paul Westrick, PhD

Profiles of high-performing college STEM students were produced based on ACT Composite scores, High School GPAs (HSGPAs), and Interest Inventory scores (shown as Work Task Dimension scores) to underscore the importance of precollege academic achievement and measured interests.<sup>5</sup>

- STEM students were divided into STEM-Biological and STEM-Quantitative categories.
- “High-performing” was defined as earning a semester GPA (SGPA) of 3.0 or higher consecutively in semesters five through eight (academic years three and four).
- Semesters five through eight is when the majority of students’ courses should be related to their academic major.

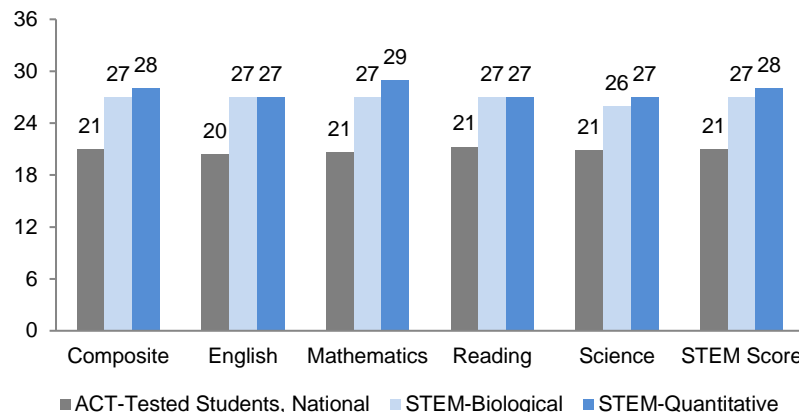
In the following three figures, the profiles of high-performing STEM majors are contrasted with national averages. The first figure presents average ACT scores. The second presents average high school GPAs. The third figure presents plots of students’ Data-Ideas/People-Things work dimension scores derived from ACT Interest Inventory scores.

The nation aims to increase the number of students in the STEM pipeline,<sup>1,2,3</sup> but encouraging more students to pursue STEM studies regardless of their academic achievement levels and interests may reduce the already low STEM degree completion rate of 37%.<sup>4</sup> It would be helpful to know what successful college students majoring in STEM fields looked like before they entered college, at least regarding their academic achievement levels and measured interests, and encourage high school students with similar profiles to pursue STEM studies.

This study provides precollege profiles of students who went on to be high-performing STEM majors in college.

**Paul Westrick** is a research scientist in Statistical and Applied Research specializing in postsecondary outcomes research and validity evidence for the ACT test.

**Mean ACT Scores for High-Performing STEM Majors**



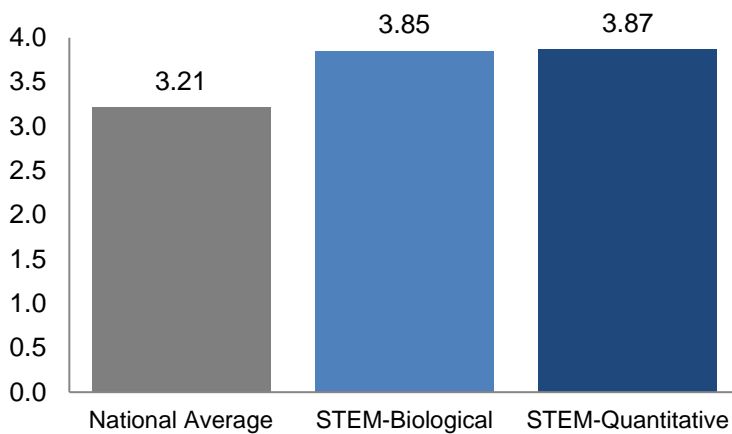
## Findings

- Average ACT STEM scores for higher-performing students were 27 for STEM-Biological and 28 for STEM-Quantitative majors.
  - These averages exceed the ACT STEM Readiness Benchmark of 26.

## Acknowledgements

The author thanks Krista Mattern, Ty Cruce, Jeff Allen, and Justine Radunzel for their feedback on earlier versions of the research report, and Kurt Burkum, Teri Fisher, and Emily Neff for their feedback on this issue brief.

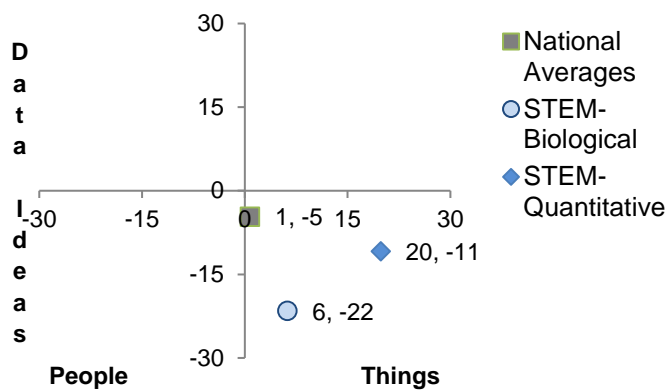
**Mean HSGPAs for High-Performing STEM Majors**



**Findings**

- The average ACT scores and HSGPAs for high-performing STEM majors were well above the national averages.
  - These averages would be in the top 20% of the ACT-tested population.

**Mean Work Task Dimension Scores for High-Performing STEM Majors**



**Findings**

- The STEM majors' measured interests tilted toward Things and Ideas on the work task dimensions, consistent with previous research.<sup>6</sup>
- STEM-Biological and STEM-Quantitative majors had

**Key Takeaways**

- These results suggest that high-performing undergraduate STEM majors were high-performing high school students.
- The results emphasize the importance of preparing students academically during high school.
- Students need to receive enough information about precollege academic preparation in order to be ready for future studies in STEM.

**Notes**

<sup>1</sup> National Governors Association. (2007). *Building a science, technology, engineering, and math agenda*. Washington, DC: National Governors Association.

<sup>2</sup> National Research Council. (2012). *Monitoring Progress Toward Successful K-12 STEM Education: A Nation Advancing?* Washington, DC: National Academic Press.

<sup>3</sup> National Science Board. (2007). *A national action plan for addressing the critical needs of the U.S. science, technology, engineering, and mathematics education system*. Arlington, VA: National Science Foundation.

<sup>4</sup> Chen, X. (2013) *STEM attrition: College students' paths into and out of STEM fields* (NCES 2014-001). Washington, DC: U.S. Department of Education, National Center for Education Statistics.

<sup>5</sup> For more information, see Westrick, P. (2017). *Profiles of high-performing STEM majors*. Iowa City, IA: ACT.

<sup>6</sup> ACT. (2009). *The ACT Interest Inventory technical manual*. Iowa City, IA: ACT.