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those who come from low-income households. Taking the physics GRE requires a \$150 fee. If applicants apply to more than four programs, they pay an extra \$27 per school to share the test results. Travel costs must be considered as well, because some students may not be near a GRE testing center. Arizona and Nevada, for example, each have only one such site in the state.

If the test provided useful information for admission, perhaps those problems would be tolerable. Medicines have side effects, but medical professionals prescribe them when the benefits outweigh the risks. Such is not the case with the physics GRE. A study of nearly 4000 physics PhD students⁴ found only a minor difference between the fractions of high- and low-scoring applicants who completed their PhDs.

Earning a PhD is only one part of being a successful graduate student. Research success is just as important, but the GRE is not helpful in that respect either. One study looked at 149 past recipients of the most prestigious astronomy research fellowships and found that many of them had scored below a typical admissions cut-off on the physics GRE.⁵

Departments would have already removed the physics GRE requirement if doing so were simple. Some faculty members advocate keeping the GRE because they believe it measures something useful. Perhaps departments could compromise and allow applicants to choose whether to submit scores. It seems like having the choice would benefit those who score poorly or who cannot afford to take the test. However, applicants have varying ideas about what “test-optional” means.

As part of a larger 2020 study on physics GRE requirements creating an uneven playing field, researchers from Rochester Institute of Technology interviewed 19 graduate students who had applied to test-optional programs. The 10 women reported submitting their scores, regardless of how well they did, while the 9 men had submitted scores only if they were stellar. So by becoming test-optional, the admissions process may become further biased.

To make the physics graduate school admissions process more equitable, departments must expunge the physics GRE and envision how they admit applicants.

Departments could start by admitting students based on their potential in-

stead of their achievement, as recommended in the *Final Report of the 2018 AAS Task Force on Diversity and Inclusion in Astronomy Graduate Education*. Comparing achievements is of limited use when not everyone has the same opportunities.

When conducting research, scientists consider confounding factors that could invalidate their experiments. Admissions committees must do the same when admitting applicants to physics and astronomy programs. Including in evaluations academic achievement and noncognitive skills such as conscientiousness and perseverance can help departments select applicants who can be successful in their programs and do so equitably.

Furthermore, according to an Ohio State University survey, programs that have removed the physics GRE have had more applicants, especially among those identifying as Black, Latinx, and Native American.

The coronavirus has caused departments to rethink how to evaluate applicants. What a great opportunity to remove one of the least equitable parts of the process!

References

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Corrections

October 2020, page 40—In the caption for figure 1, the increase in the number of physics PhDs at US universities over the past 15 years should be 75%.

November 2020, page 28—Daniel Bernoulli, not David, devised a model to predict the benefits of smallpox inoculations. In box 1, the negative binomial distribution should be $P(x; R_0, k) = [\Gamma(k+x)/\Gamma(k+1)\Gamma(x)]p^k(1-p)^x$. PT