

We Can't Ignore the Pandemic Fallout in Our Physics Classes

Our students are burnt out, and we need to pay attention.

Last fall I attended the 2022 Physics Congress of Sigma Pi Sigma and Society of Physics Students (SPS). (The conference is sometimes known as PhysCon.) It is the largest gathering of physics and astronomy undergraduate students in the world—there's around 1,000 of them there plus around 200 other physicists there as mentors, speakers, etc. During the opening session, these students were surveyed about the top issues affecting physics and astronomy departments today. Among options like careers and jobs, lack of research funding, and many other issues, burnout rose to the top by a large margin. The number two spot went to mental health concerns [1].

I hear faculty saying, myself included, that the pandemic is over, get the masks off, and it's time for students to get back to 2019 levels in classroom intensity. But here's the reality, we'll be dealing with the fallout of 2020 for years to come. Math scores were down because of the pandemic and it was particularly bad for students from underrepresented backgrounds [2-6]. We need to incorporate this fact into our teaching plans or we run the risk of frying our students. Mental health issues for college-aged students is alarming [7-9]. The anxiety and stress students felt during the pandemic lead to posttraumatic symptoms [7]. It's still a tough time for students. We need to bring their academics up. Encourage them. Challenge them. Teach them. A study of first year Finnish physics majors showed that while coming back to in-person classes improved expert like thinking, it did not come entirely back to prepandemic levels [10].

Last week we were solving a problem using algebra in one of my classes. The students said what they always do, "Professor W1, we have never seen that before." I chuckled, and said "well, you saw it when you were studying for the SATs." The room went completely quiet. I stood there for a moment, looking around the room. During COVID there was a drop in the number of students who took the SATs [11]. I thought about that carefully for a moment and then began going through the algebra step-by-step.

So where do we go from here? A review in Psychology, Learning, and Teaching recommends five considerations when students transition to University during COVID [12]:

1. (Re)acclimatizing to studying.

The students have lost out on many for their formative experiences that high school offers. For example, it is difficult to go forward in college when the students are missing key math skills. Ref [12] recommends that faculty, "Clearly communicate expectations throughout the curriculum, with an emphasis on supported formative assessments, work in partnership with students, and champion flexibility". For example, we have to build those basic math skills up one step at a time.

2. Imposter syndrome and sense of belonging

Ref [12] recommends that we help facilitate peer-to-peer support and collaborative work environments. In addition to doing this in the classroom, having students to attend and share at a conference such as the aforementioned PhysCon is an excellent way for student's deeper connection with peers in the community. There are a number of less expensive local and regional conferences that are put on APS and SPS that would be excellent for students to attend.

3. Mental health consequences of COVID-19

Students are still grieving lost family members, and tolls of the past years are continuing to add up. Not to mention that any time someone gets a cough, they are bound to lose a week of classes on COVID fears. Long COVID is affecting many of us who were sick and are trying to get back into the swing of things [13]. We have to remain flexible with our students.

4. Increasingly unattainable hidden curriculum

We have to connect with our students! One of the students at PhysCon mentioned that once a week their professor used the class time to do something fun. This gets the students enjoying their studies. But it also helps to build connections between the faculty member and the student. Once we develop these connections, we have to share with them all of the little ins and outs of academic life. For example, students need to know how much time they should spend on classwork, when to ask for help, and how to work in groups. They won't know unless we tell them.

5. Accounting for (in)equality of experience

As physics instructors we need to probe our student's math and science knowledge even more than usual, and help fill in the missing gaps. We need to go slower than we'd like. And we need to have patience with our students as they come up to speed. While our expectations haven't changed as much as our students' preparation, when we ask them to perform at prepandemic levels without additional support, we're actually asking them to make greater strides than previous classes. We need to acknowledge that people from different backgrounds experienced the pandemic differently and work that into our curriculum.

Obviously, burn out isn't just a student issue. Faculty are dealing with their own burnt out and mental health issues. It has not been an easy couple of years. This is something we need to talk about, dive into, and discuss. Physicists pride themselves on being able to handle hard, stressful problems and thus physics tends to be the hardest major on campuses around the country. Obviously, we have to keep pushing our students to be excellent problem solvers, but is there a point when it is too much? We have to make sure we consider what the students have experienced over the last few years to make our classrooms as productive as possible.

I would like to thank Kendra Redmond and Katherine Gifford for providing useful feedback in developing this letter.

References

- [1] B. Conrad, S. Clardy, W. Degraffenreid, and M. J. Wright. Document in preparation.
- [2] S. Mervosh and A. Wu. Math Scores Fell in Nearly Every State, and Reading Dipped on National Exam. *New York Times*. October 24, 2022. <https://www.nytimes.com/2022/10/24/us/math-reading-scores-pandemic.html>
- [3] M. Kuhfeld, J. Soland, and K. Lewis. Test Score Patterns Across Three COVID-19-Impacted School Years. *Educational Researcher*, **51**, 500–506 (2022). <https://doi.org/10.3102/0013189X221109178>
- [4] J. Gonzalez-Ramirez, *et. al.*, Emergency Online Learning: College Students' Perceptions During the COVID-19 Pandemic. *College Student Journal*. **55**, 29-46 (2021).

- [5] K. Werner and L. Woessmann. The Legacy of COVID-19 in Education. CESifo Working Paper No. 9358, (2021). <http://dx.doi.org/10.2139/ssrn.3945280>
- [6] D. Contini, et. al., "Who Lost the Most? Mathematics Achievement during the COVID-19 Pandemic" The B.E. Journal of Economic Analysis & Policy **22**, 399-408 (2022). <https://doi.org/10.1515/bejeap-2021-0447>
- [7] K. Tomaszek and A. Muchacka-Cymerman, "Student Burnout and PTSD Symptoms: The Role of Existential Anxiety and Academic Fears on Students during the COVID 19 Pandemic", Depression Research and Treatment, **2022**, 6979310 (2022). <https://doi.org/10.1155/2022/6979310>
- [8] D. Ochnik, *et al.* Mental health prevalence and predictors among university students in nine countries during the COVID-19 pandemic: a cross-national study. Scientific Reports **11**, 18644 (2021). <https://doi.org/10.1038/s41598-021-97697-3>
- [9] M. Gogoi, A. Webb, M. Pareek, C. D. Bayliss, and L. Gies. University Students' Mental Health and Well-Being during the COVID-19 Pandemic: Findings from the UniCoVax Qualitative Study. International Journal of Environmental Research and Public Health **19**, 9322 (2022). <https://doi.org/10.3390/ijerph19159322>
- [10] T. Hynninen, H. Pesonen, O. Lintu, and P. Paturi. Ongoing effects of pandemic-imposed learning environment disruption on student attitudes. Physical Review Physics Education Research. **19**, 010101 (2023). <https://doi.org/10.1103/PhysRevPhysEducRes.19.010101>
- [11] S. Jaschik. 700,000 Fewer Took the SAT. Inside Higher Education. September 20, 2021. <https://www.insidehighered.com/admissions/article/2021/09/20/sat-annual-report-says-those-who-took-test-fell-700000>
- [12] M. Pownall, R. Harris, and P. Blundell-Birtill. Supporting Students During the Transition to University in COVID-19: Five Key Considerations and Recommendations for Educators. Psychology Learning and Teaching. **21**, 3-18 (2021). <https://doi.org/10.1177/1475725721103248>
- [13] R. L. Păunescu, I. V. Micluția, O. R. Verișezan, and B. D. Crecan-Suciu. Acute and long-term psychiatric symptoms associated with COVID-19. Biomedical Reports **18**, 4 (2023). <https://doi.org/10.3892/br.2022.1586>