



# Learning from the COVID-19 Pandemic: How Faculty Experiences Can Prepare Us for Future System-Wide Disruption

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The COVID-19 pandemic provided education researchers with a natural experiment: an opportunity to investigate the impacts of a system-wide, involuntary move to online teaching and to assess the characteristics of individuals who adapted more readily. To capture the impacts in real time, our team recruited college-level geoscience instructors through the National Association of Geoscience Teachers (NAGT) and American Geophysical Union (AGU) communities to participate in our study in the spring of 2020. Each weekday for three successive weeks, participants ( $n = 262$ ) were asked to rate their experienced disruption in four domains: teaching, research, ability to communicate with their professional community, and work-life balance. The rating system (a scale of 1–5, with 5 as severely disrupted) was designed to assess (a) where support needs were greatest, (b) how those needs evolved over time, and (c) respondents' capacity to adapt. In addition, participants were asked two open-response questions, designed to provide preliminary insights into *how* individuals were adapting—what was their most important task that day and what was their greatest insight from the previous day. Participants also provided information on their institution type, position, discipline, gender, race, dependents, and online teaching experience (see supplemental material<sup>1</sup>).

When it was evident that disruptions would continue through the 2020–2021 academic year, we issued a one-time follow-up

survey to participants ( $n = 109$ ) in October 2020 to inquire about teaching practices in the fall semester (see supplemental material). Survey questions asked about usefulness of supports available to faculty (i.e., instructional designers, internal and external colleagues, online resources) using a Likert-scale (1–5, with 5 as very helpful). Participants also responded to short answer prompts regarding what has been most helpful and what they have learned and will continue to do. From this group, we interviewed 22 participants in early 2021 to gain further insight into the challenges and triumphs they had experienced over the previous 10 months (see supplemental material). Data from both surveys and the interviews were analyzed through a grounded theory approach, iteratively coding the data and extracting themes. Here, we address one question that emerged from our work: ***How did disruption to teaching and capacity to adapt evolve over the course of the pandemic?***

## REAL-TIME DISRUPTION EARLY IN THE PANDEMIC

In the spring 2020 15-day survey, average ratings of perceived teaching disruption (one of the four domains about which we inquired) were moderate (mean = 2.98, SD = 1.28). It is possible that the moderate disruption level is biased, and that those faculty experiencing the greatest disruption were less likely to complete the daily survey. Regardless, we found patterns that provide insight into individuals' capacity to adapt.

Levels of reported disruption did not differ significantly by participants' institution type or by their experience: In fact, disruption to teaching was pervasive and experienced even by those with extensive online teaching experience. On the other hand, non-tenure-track (NTT) faculty reported increasingly more disruption over time than tenure track (TT) faculty (increases over the 15 days of 0.37 and 0.03, respectively,  $t = 1.69$ ,  $p < 0.10$ ).

We hypothesize that the greater disruption experienced by NTT faculty results from a sense of the precariousness of their positions, a theme seen in open responses such as this one:

“My career plans may have to drastically change, even though I love teaching. I am on an 18-month contract, and I doubt the academic job market will look good in Jan/Feb 2021 when I planned to look. ... universities around the world are losing money, implementing hiring freezes, and laying off employees.” —Female Geology Faculty, NTT, Doctoral Granting Institution, Day 12

Data collected later showed that ~90% of faculty members remained employed throughout the COVID-19 pandemic, with the highest rate of unemployment being among students and post-doctoral fellows (Gonzalez and Keane, 2021). However, during our spring 2020 survey, longterm outcomes were unknown and weighed on the minds of respondents.

Though at least one study has shown the negative long-term impacts of the pandemic

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<sup>1</sup>Supplemental Material. Demographic information for participants in all phases of the study and the survey and interview questions for all phases of the study. Go to <https://doi.org/10.1130/GSAT.S.17209481> to access the supplemental material; contact [editing@geosociety.org](mailto:editing@geosociety.org) with any questions.

on female faculty (NASEM, 2021), using two-way ANOVA, we found no statistically significant interaction between the effects of gender and dependents on level of disruption reported by instructors, ( $F(1,96) = 0.449, p = 0.504$ ). Respondents mentioned children and childcare often as the “most important thing” they needed to do that day (as below), but the frequency of such responses did not correlate with gender identity, nor did gender correlate with number of dependents in disruption ratings:

“I needed to re-arrange my schedule to do extra childcare this week because my wife (also an academic) has more commitments this week. Every week ends with a conversation about how to balance both of our schedules. My wife is pre-tenure and I’m tenured, so every plan is run through that filter as well because we need to maximize her time more than mine.” —Male Professor, Doctoral Granting Institution, Day 2

This male participant’s family unit was making decisions about childcare grounded in the tenure process rather than traditional gender roles. A female participant described another non-gendered approach: Her extended family moved closer so that four adults could rotate responsibility for the children, increasing each adult’s dedicated working time.

The survey specifically asked faculty to report dependents under the age of 15, but participants also reported caregiving for teenagers, adult children, and aging parents:

Our son is depressed and it’s getting harder and harder for him to find any joy with online learning in high school. Being around him all day I can understand how isolating this type of education is. I don’t recommend it for a single child. —Female Professor, Doctoral Granting Institution, Day 15

Family caregiving therefore extended beyond the typical gender roles and age ranges normally examined.

## ONGOING DISRUPTION

College-level teaching comes with inherent variability as courses and students change each term. In our interviews, participants reported that the advance notice and time over the summer to prepare for the fall influenced their perception of the fall as less disruptive than the preceding spring, particularly when re-teaching courses. One participant reflected:

I spent the summer working with the instructional design people, they helped me redesign my Blackboard shells, so I have them organized. —Female, NTT Geology at Doctoral Granting Institution

For some, summer allowed time for preparing new materials, learning new tools, and thinking deeply about instructional needs.

However, some participants did not recall fall as more or less stressful, saying the two semesters were incomparable. When asked, they described the two as “apples and oranges” (Female Associate Professor, Geology, Doctoral Granting Institution). This was due to changes in course type, class sizes, and level of students. When surveyed in the fall, participants reported a higher level of disruption to teaching responsibilities when the delivery format for two or more courses changed (mean = 3.80) rather than for a single course (mean = 3.31) ( $F(1, 98) = 5.83, p < 0.001$ ). However, neither the timing of the decision to change the delivery format, nor the level of involvement in making the decision to change the delivery format, predicted disruption ratings, both  $p > 0.05$ . In other words, advance notice did not help those who were teaching different courses or multiple courses feel less disruption in their teaching when format changed, despite the experience of the previous term.

In addition, participants reported minimizing or even completely ignoring their research agendas to be able to adapt to teaching and that greater amounts of time spent grading was a common theme. These shifts in the amount of time dedicated to teaching are not unexpected in a new course or setting but are not sustainable in the long term.

## PREPARING FOR FUTURE DISRUPTIONS

A better understanding of how participants’ disruption and capacity to adapt evolved over time can help departments and institutions better support their faculty in future disruptions. Our data show that capacity to adapt to disruption was influenced by the entire family unit’s capacity to adapt: Individuals with strong family networks were able to establish new systems for childcare, for example, but when caregiving responsibilities extended beyond childcare to older children or parents, the system was less

adaptable. In addition, our data show that a variety of physical, social, and cognitive resources aided faculty in adapting to their evolving situation, including instructional design professionals, digital learning communities, quality learning management software—and that not everyone needed the same thing. Departments and institutions need to pay particular attention to NTT faculty, who may experience greater despair in the face of perceived uncertainty.

Not surprisingly, a common theme in the qualitative reports is time. When provided the summer to prepare to teach their specific geoscience course online, most participants felt less disrupted, yet they still reported dedicating more time to teaching. Departments and institutions can do some things to give faculty time, such as making decisions early about course modality to allow faculty to prepare, but this is not always possible. Other ways to provide time include extending the tenure clock and hiring graduate students or post-docs to support teaching.

We continue to analyze this data moving forward to examine the ways in which faculty have described the dilemmas to teaching (Windschitl, 2002) in their daily diary responses. We hope from this in-progress analysis to offer more detailed support structures for geoscience faculty to navigate future disruptions to teaching.

## REFERENCES CITED

- Gonzalez, L., and Keane, C., 2021, COVID-19 Impacts to Academic Department Operations, January to August 2021: American Geophysical Union: <https://www.americangeosciences.org/geoscience-currents/covid-19-impacts-academic-department-operations-january-august-2021> (accessed 13 Nov. 2021).
- National Academies of Sciences, Engineering, and Medicine (NASEM), 2021, The Impact of COVID-19 on the Careers of Women in Academic Sciences, Engineering, and Medicine: Washington, D.C., The National Academies Press, <https://doi.org/10.17226/26061>.
- Windschitl, M., 2002, Framing constructivism in practice as the negotiation of dilemmas: An analysis of the conceptual, pedagogical, cultural, and political challenges facing teachers: Review of Educational Research, v. 72, no. 2, p. 131–175, <https://doi.org/10.3102/00346543072002131>.

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