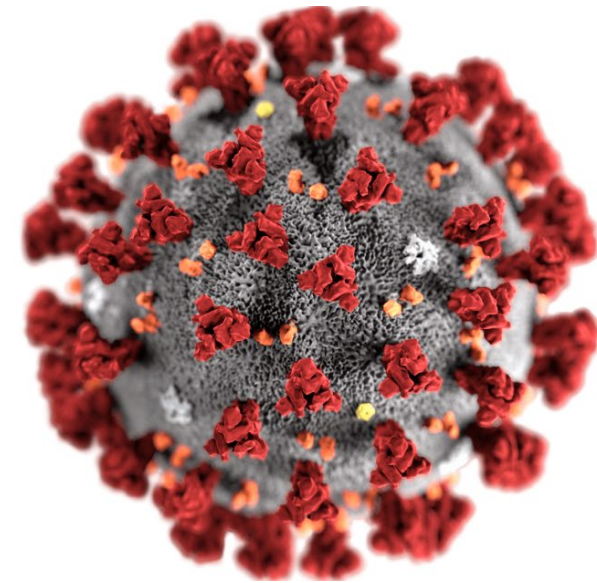


Geoscience COVID-19 Impacts Study Update

Impacts of COVID-19 on the Geoscience Enterprise:
How Permanent Will Academic Program and Workforce Changes Be?

Leila M. Gonzales & Christopher M. Keane

21 March 2022

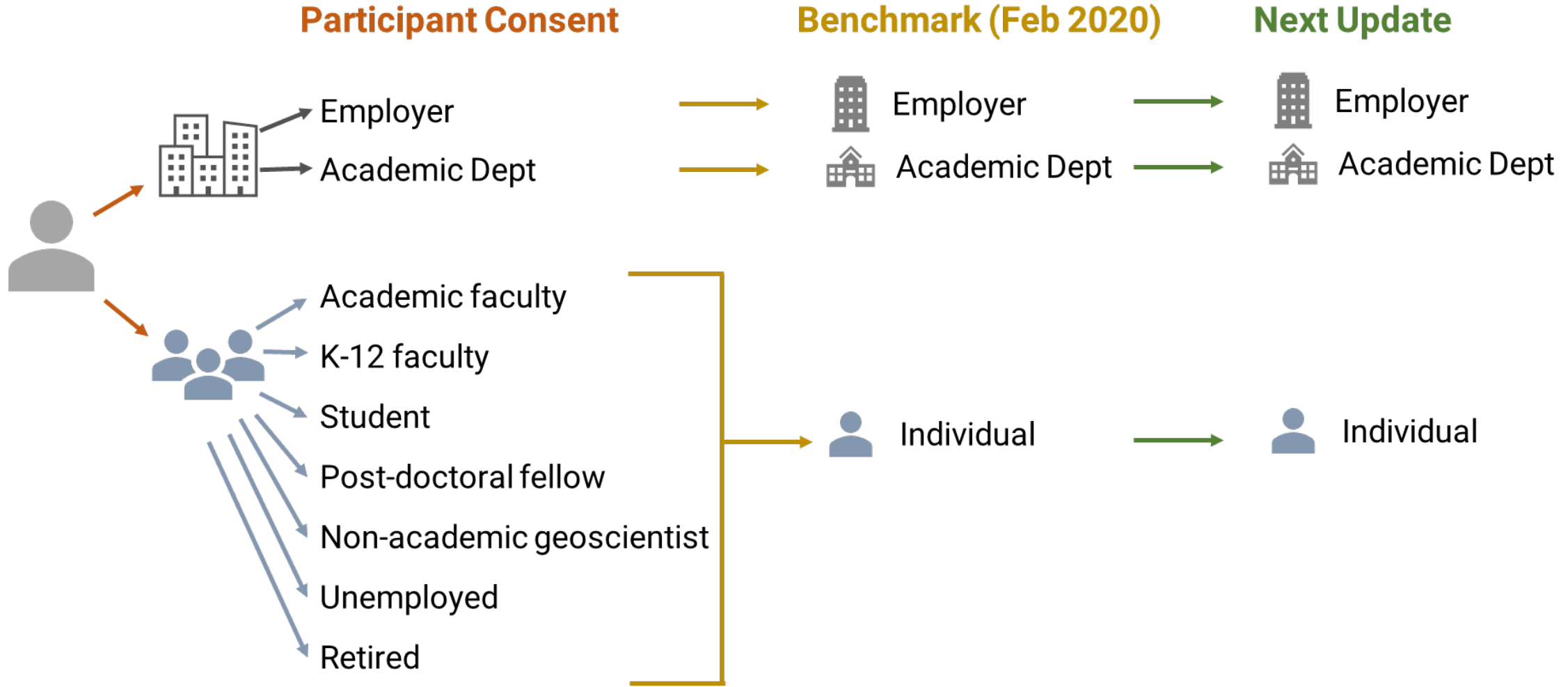


Funding for this project is provided by the National Science Foundation (Award #2029570). The results and interpretation of the survey are the views of the American Geosciences Institute and not those of the National Science Foundation.

Project Goals

- Assess short-term and long-term impacts of pandemic
- Establish a baseline of pre- and post-COVID-19 workplace and instructional environments
- Assess the magnitude and permanency of changes to workplace and instructional environments
- Inform response and recovery planning for future disasters and disruptions to work and instructional environments

Survey Design



Data Type	Consent	Benchmark	Next Update
Participant Type	I	I	I
Employment / Enrollment Status	I	I	I
Organizational Affiliation	I A E	I	I
Educational Background	I	I	I
Job-seeking Activities	I	I	I
Retiree Activities	I	I	I
Work / Learning Environment		I A E	I A E
Academic Activities		I A	I A
Work & Research Activities		I A E	I A E
Professional Development		I	I
Outlook & Concerns		I A E	I A E
Contact Info	I A E		
Demographic Info	I		
Business Operations		A E	A E



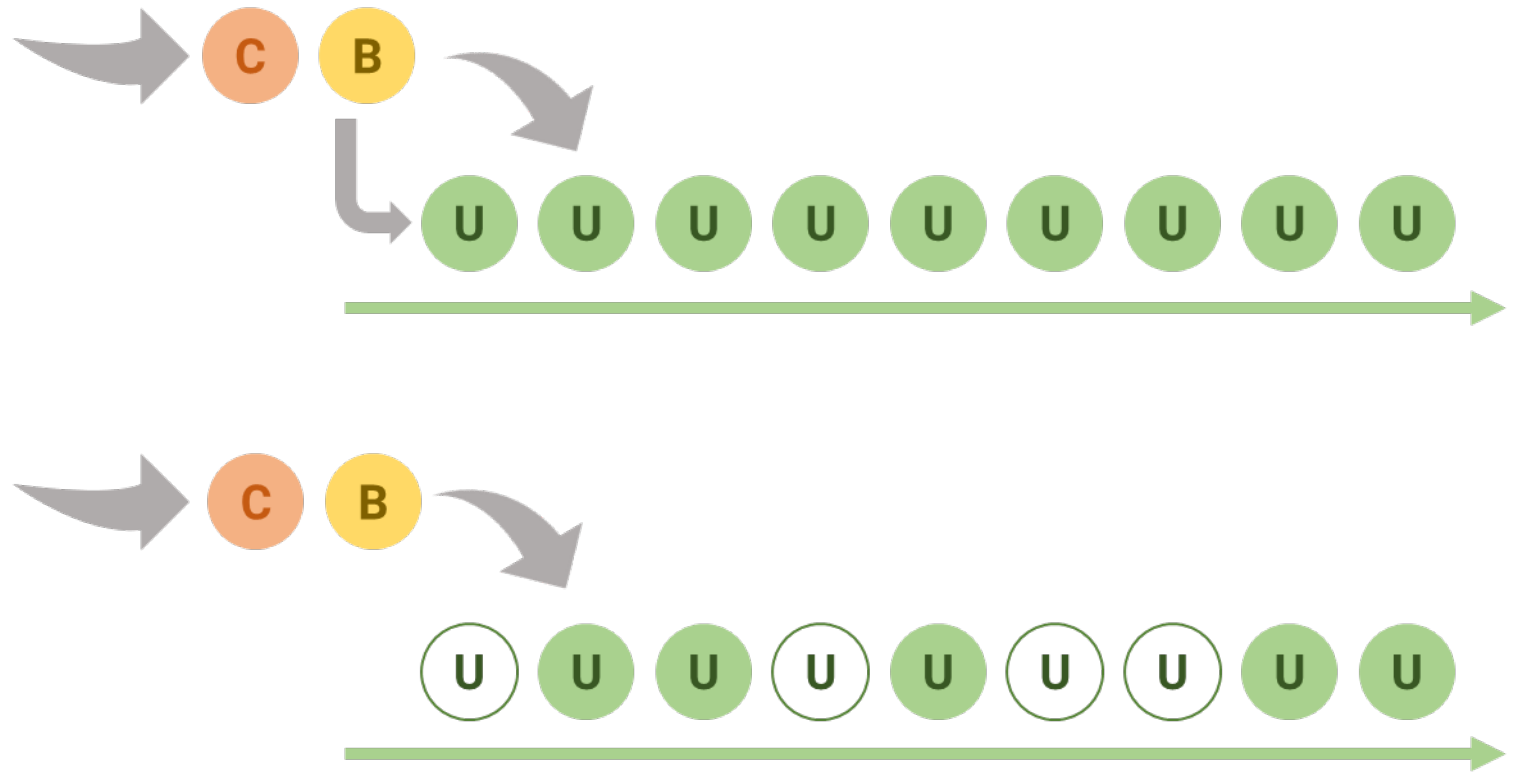
Survey Design

Multi-cohort longitudinal survey

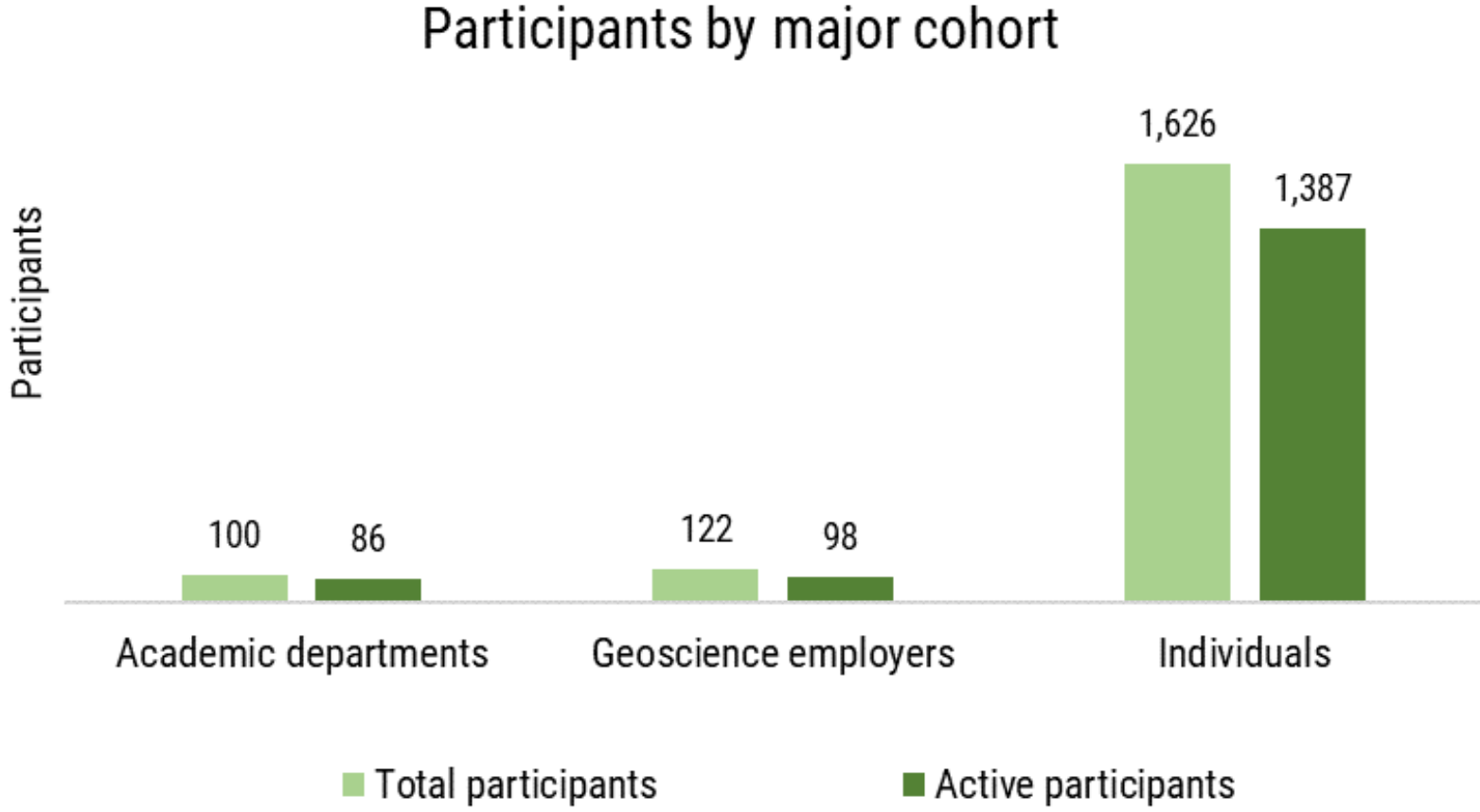
Continuous onboarding
May 2020 – Dec 2021

Participants are not required
to answer every survey

Survey sent every 2 weeks



Survey participation by major cohort



Response rates

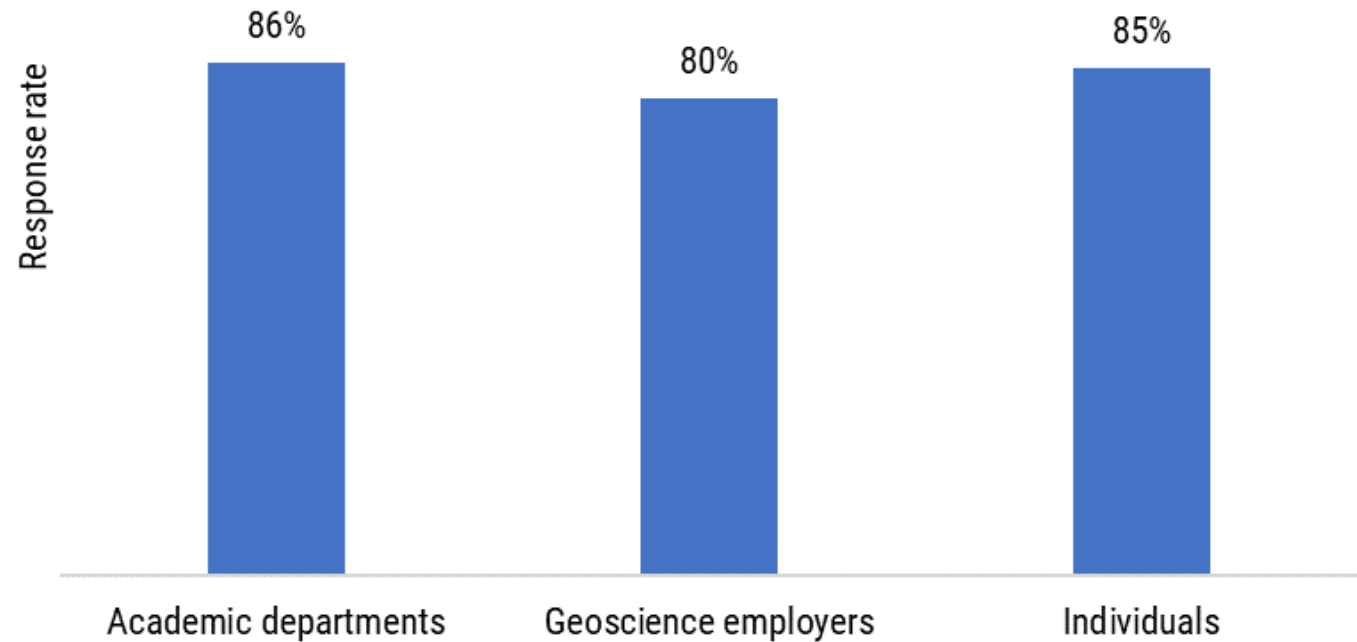
Chained response rate (CRR)

$$\text{CRR} = \text{AP} / \text{C}$$

AP: Number of active participants

C: Total number of consents

Chained response rates per major cohort



What we've learned...

- Impacts to departments and instructional formats
- Impacts to skills/knowledge acquisition
- Impacts to workplace environments
- What changes persist?

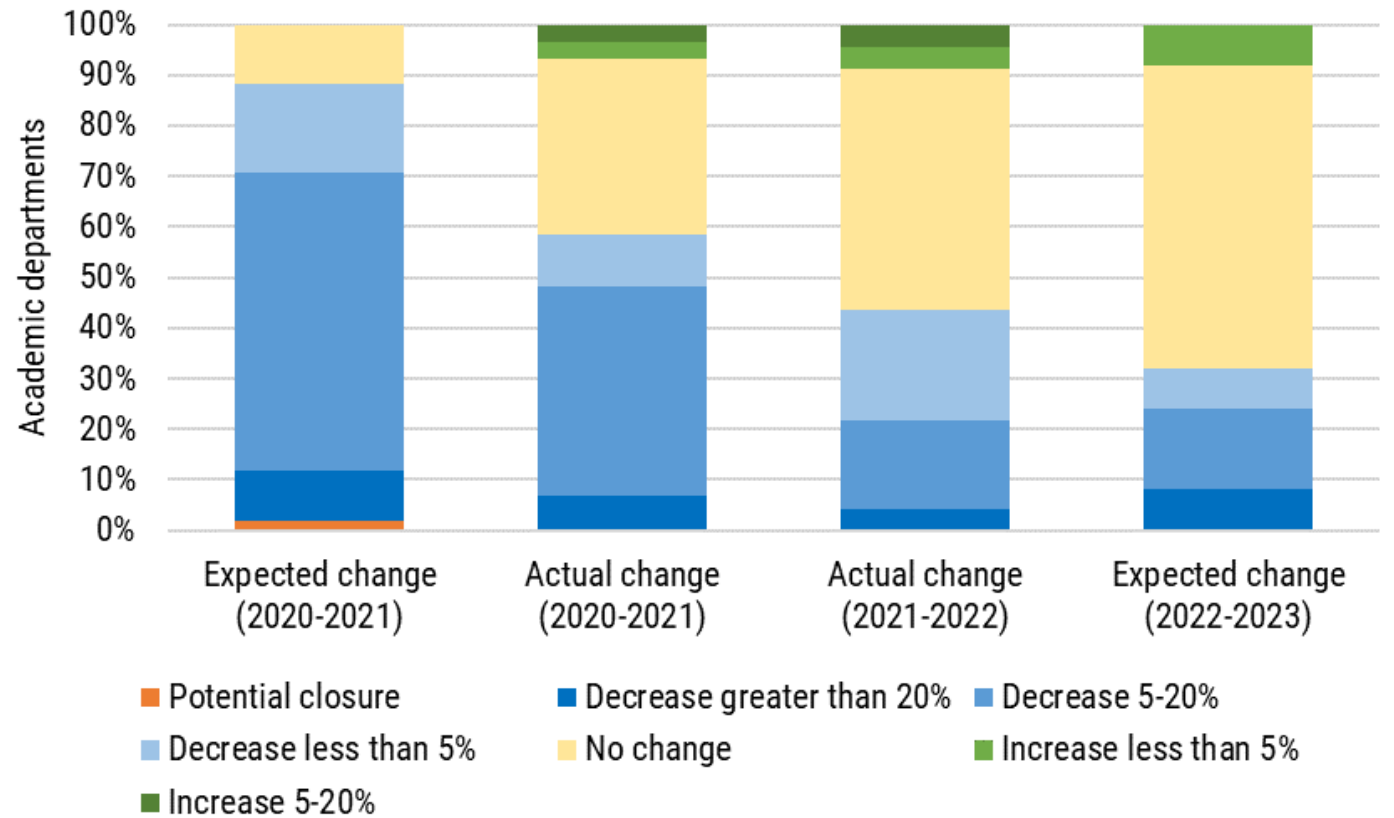
Departmental Budgets

Budget cuts less severe than expected.

Outlook is improving with less than 1/3 of departments expecting budget cuts for the coming academic year.

60% expecting no change in budget for the coming academic year.

Budget changes for academic departments



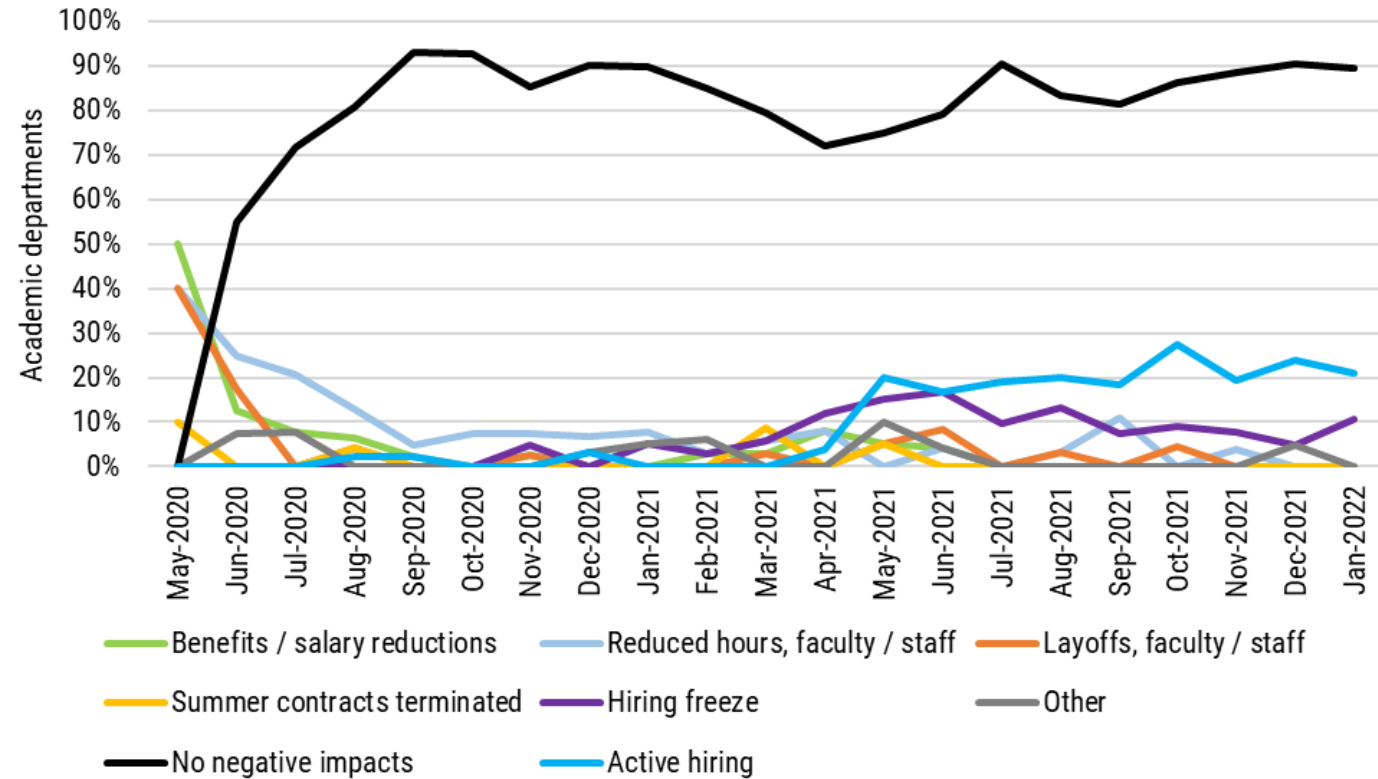
Staffing Impacts

Most impacts occurred during Summer 2020 with focus on reduction in hours and furloughs of staff and non-tenured faculty.

Active hiring picked up in May 2021 and has remained at a relatively steady rate.

Hiring freezes / positions left unfilled persists for about 10% of departments.

Departmental staffing impacts

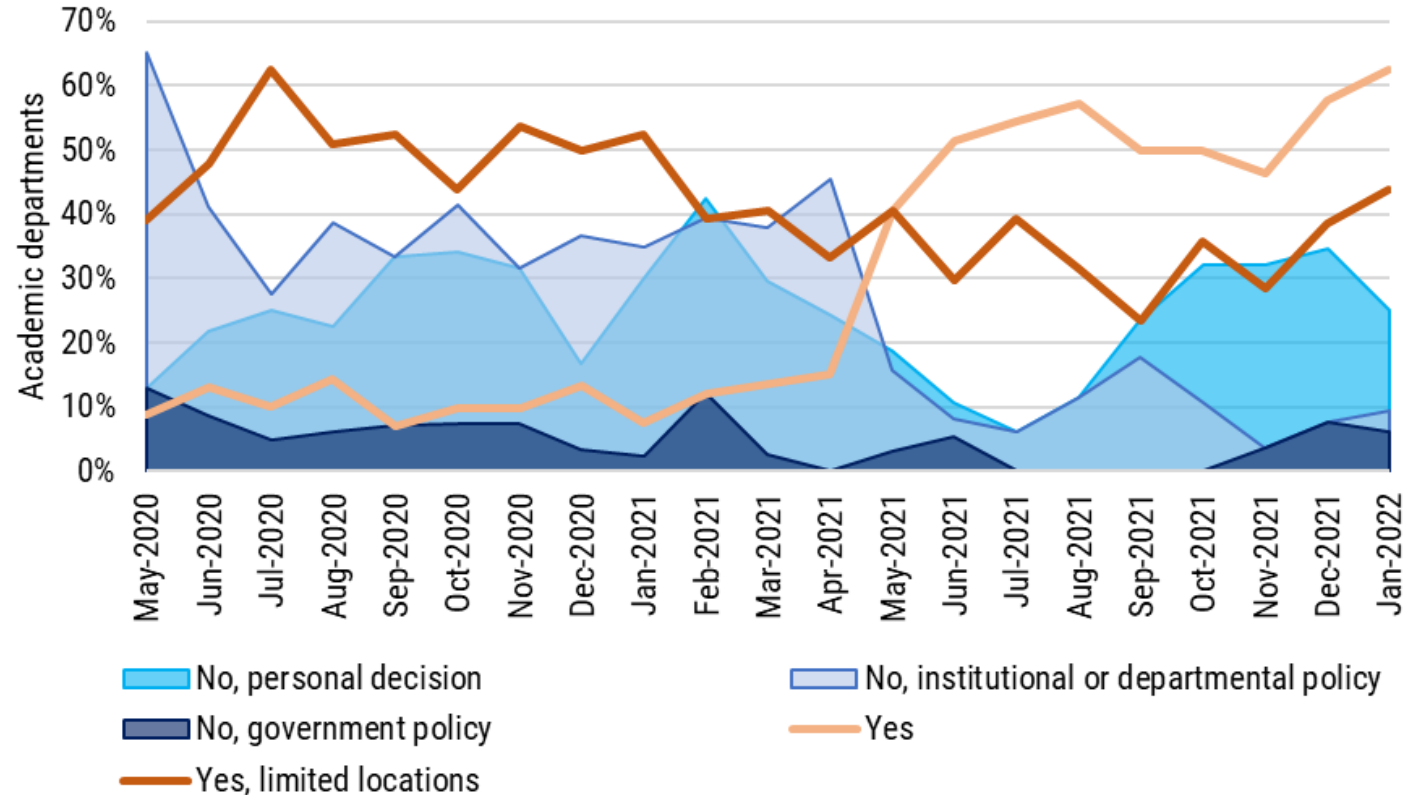


Staffing Impacts

With vaccine availability, regulatory prohibitions on travel and field activities substantially diminished.

With Delta and Omicron surges, we see an uptick in limitations as well as faculty deciding to forgo travel and field activities.

Departments with faculty on travel or in the field

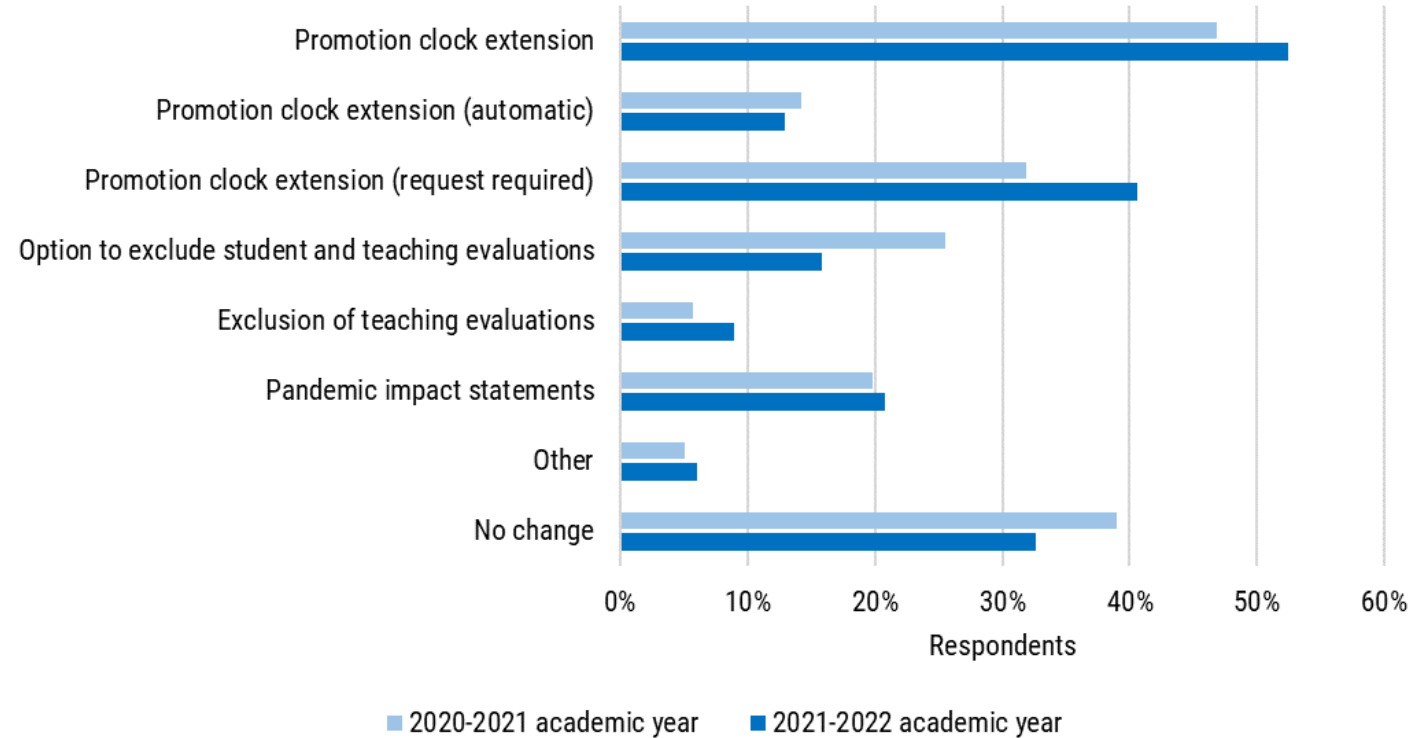


Promotion & Tenure Guidelines

Changes in promotion and tenure guidelines focused primarily on promotion clock extension, with most departments requiring faculty to opt-in to take advantage of the accommodation.

Over 80% of faculty reported not opting to take advantage of accommodations.

Changes to promotion and tenure guidelines for pandemic impacts



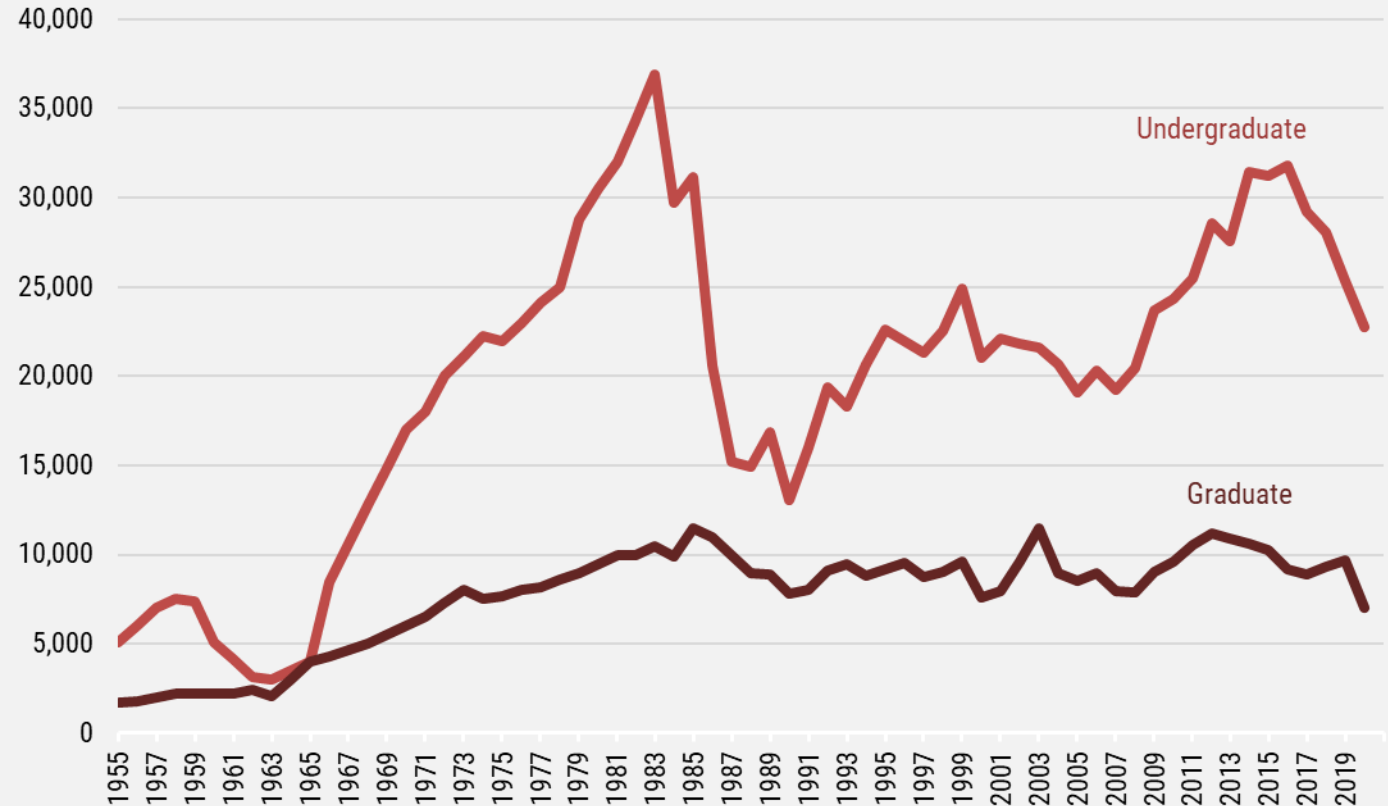
Enrollments

Recent enrollment declines from:

- Contraction of oil and gas sector
- Increase in online programs
- Declines in on-campus majors

Graduate enrollment trend likely related to pandemic impacts to degree completion

Geoscience Student Enrollment 1955-2020
United States Colleges and Universities



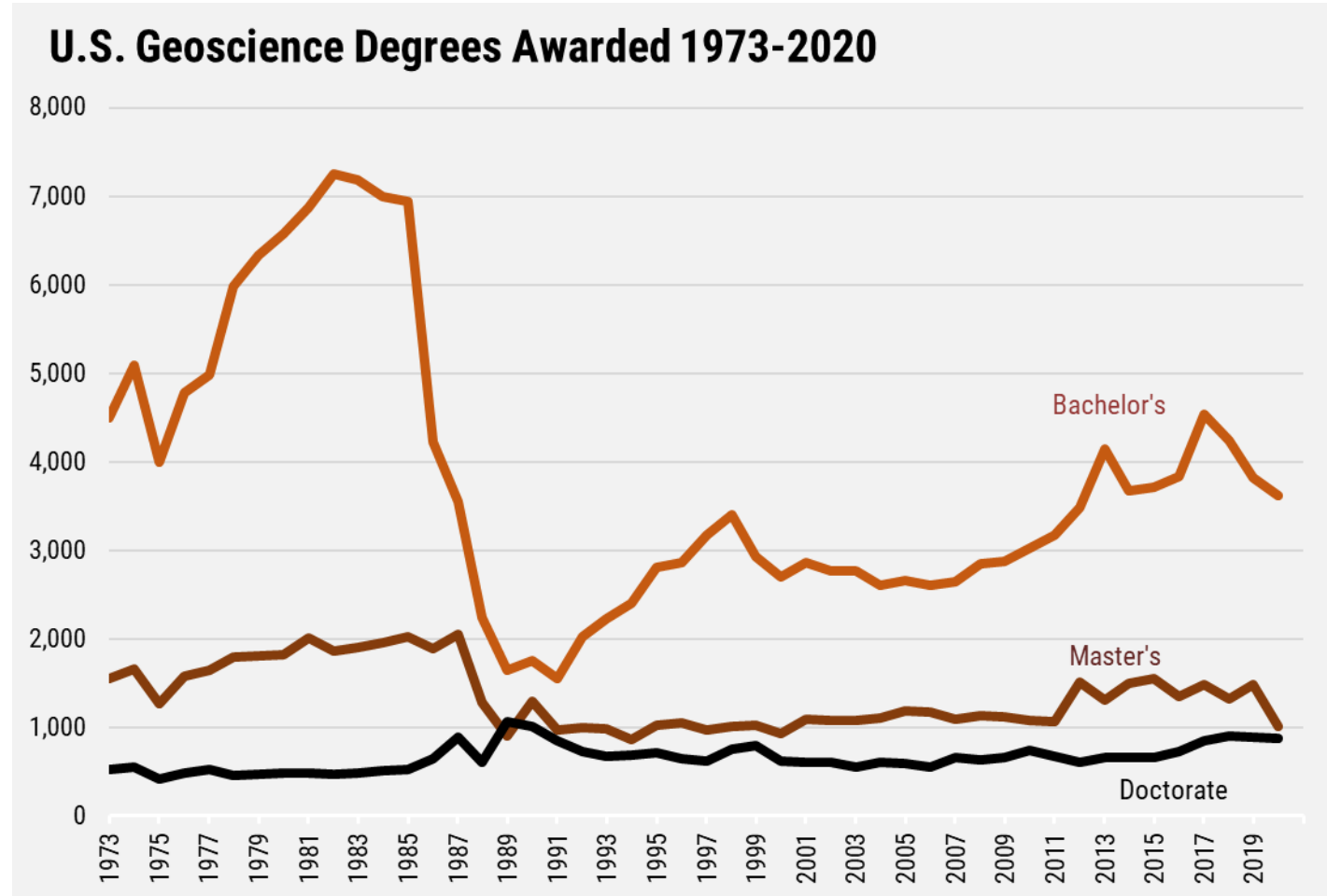
Degrees

Recent declines due to:

lower enrollments

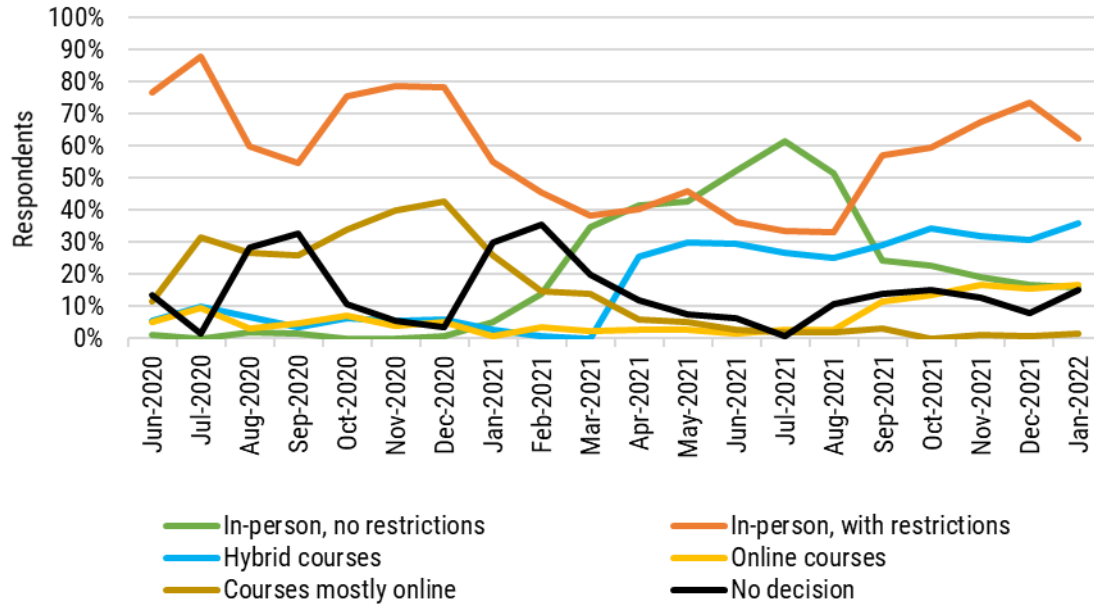
pandemic impacts on completion

soft job market

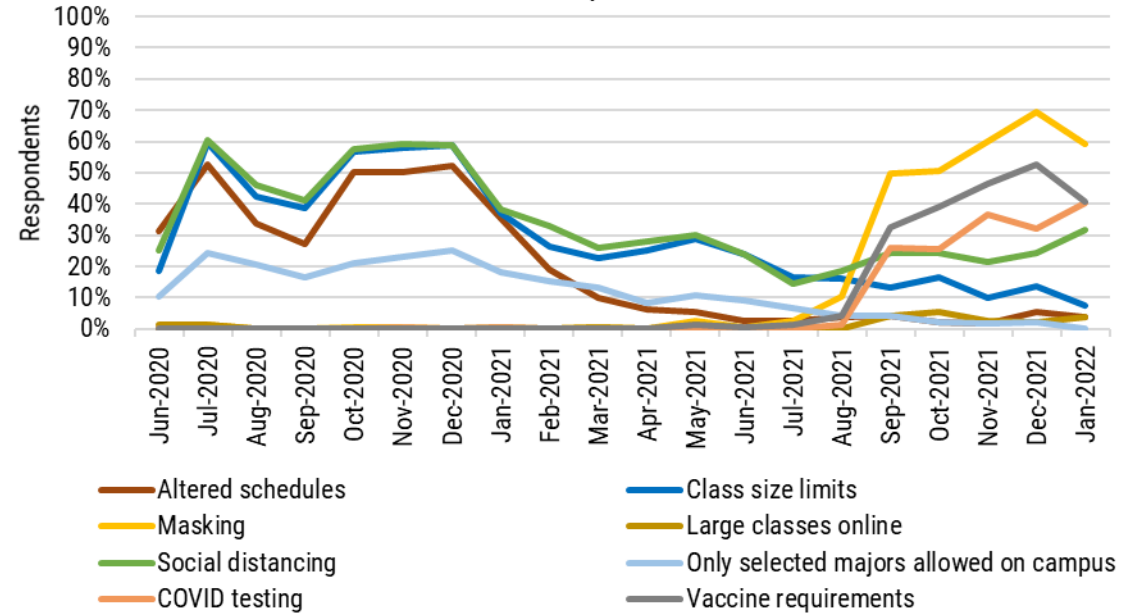


Institutional Plans

Institutional plans for next academic term



Institutional plans for next academic term:
Restrictions for in-person activities



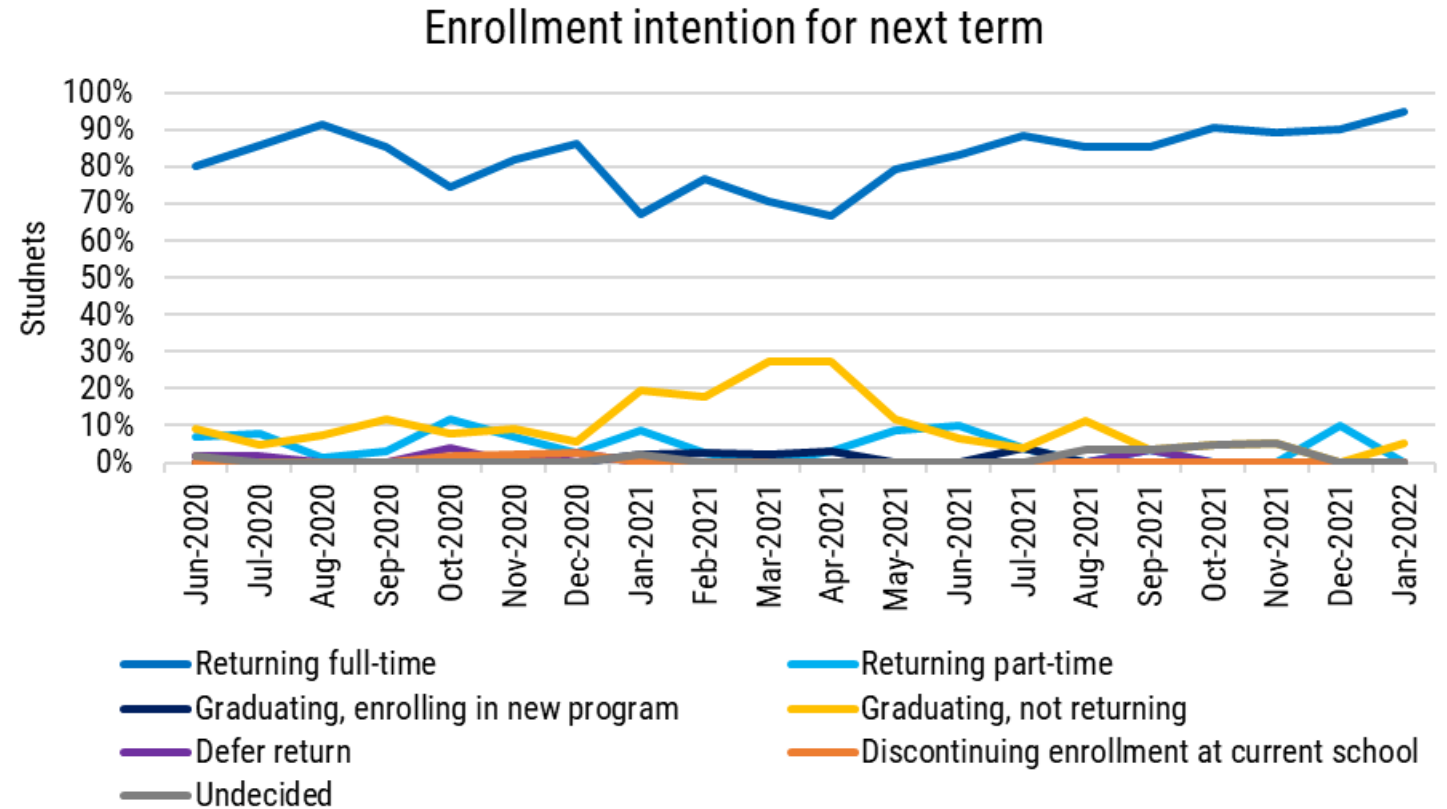
Hopes for a return to normal diminished by Delta and Omicron surges.

Current expectations are in-person instruction with masking, testing, and vaccines, with some institutions planning to continue hybrid course options.

Continuing Students – Enrollment Intention

Continuing students persisting in academic studies.

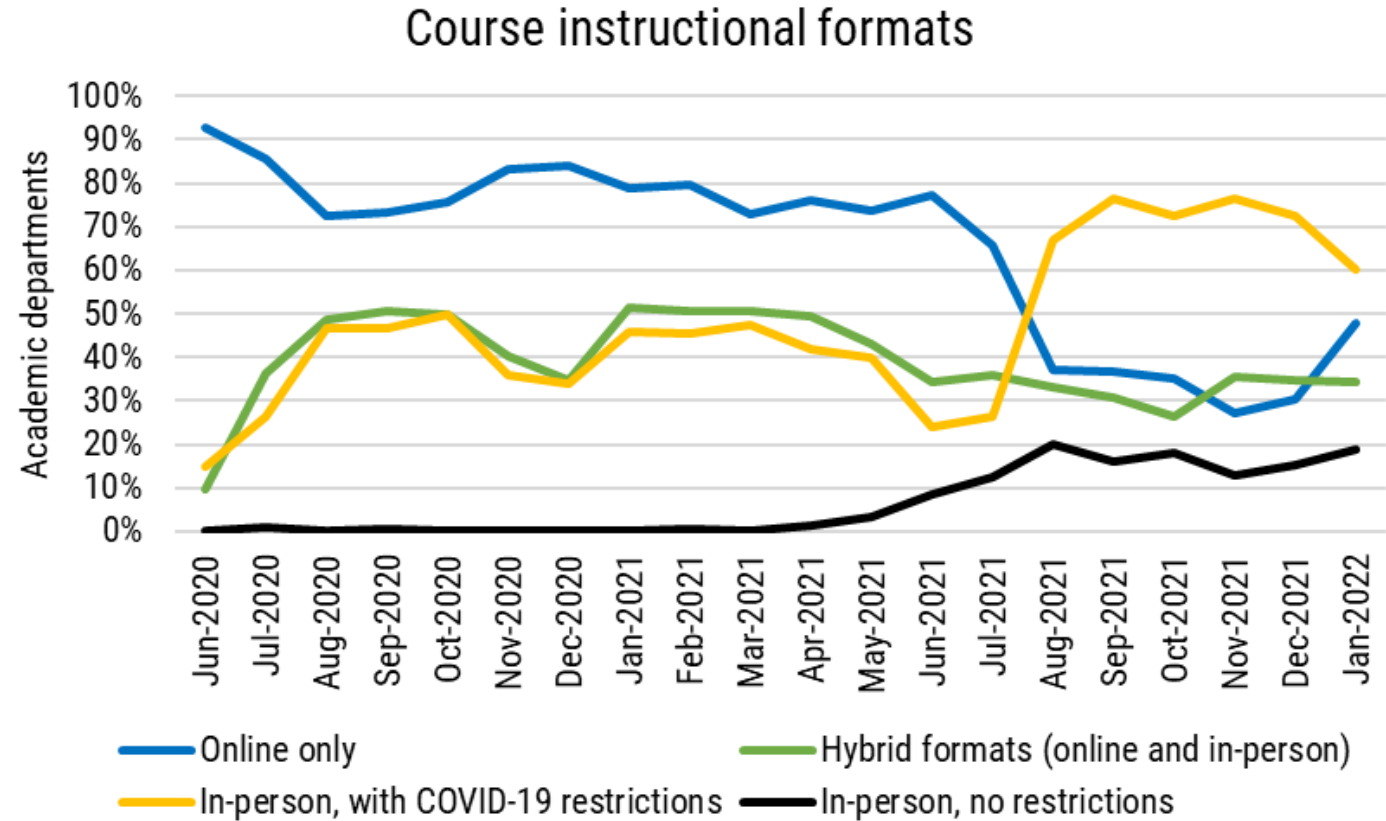
Small cohorts of students delaying graduation and returning part-time to finish studies in Fall 2020 and Fall 2021.



Instructional Formats

Most departments offering *only* in-person instruction (primarily with COVID-related restrictions).

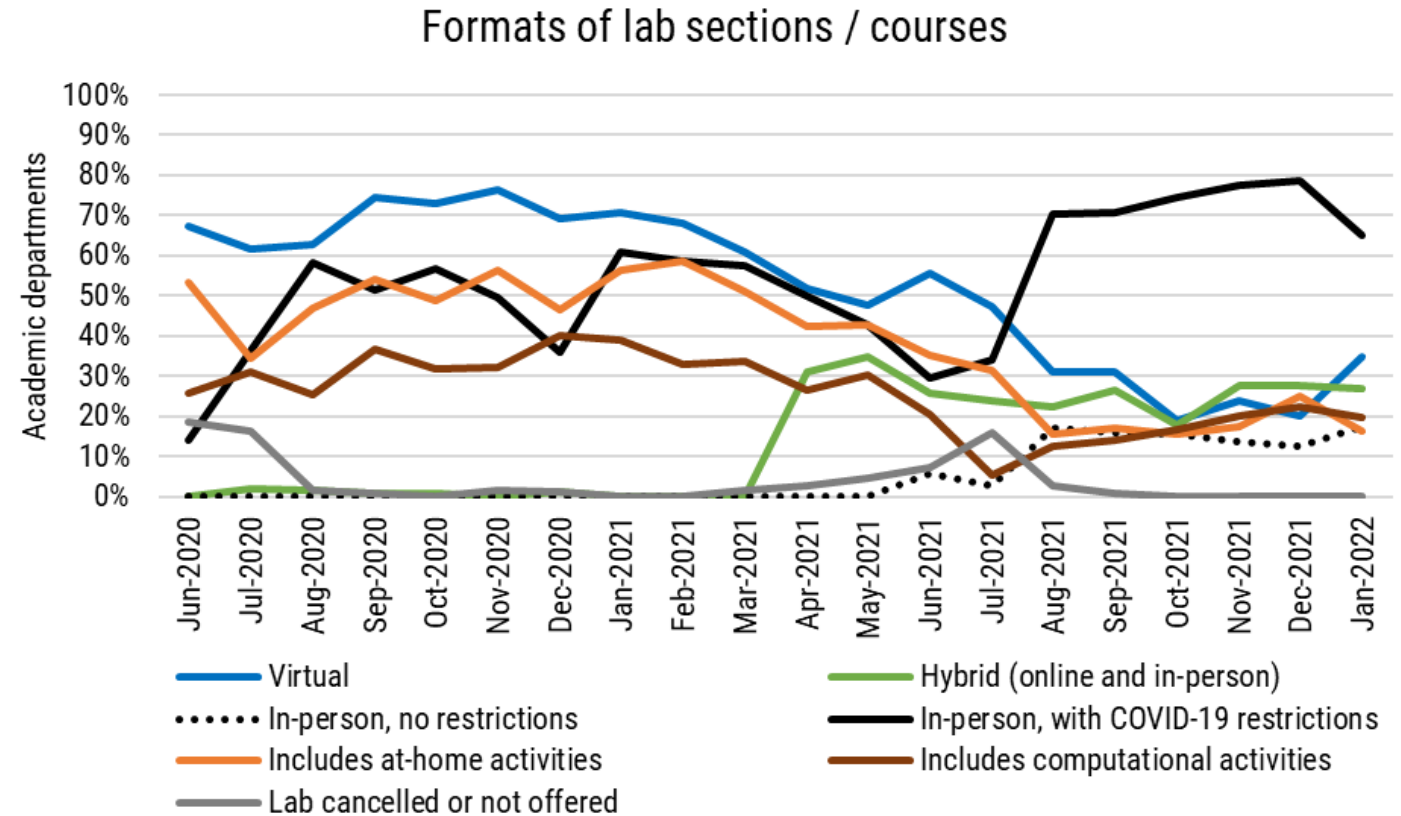
Nearly 1/4 of departments offering dual mode with a combination of in-person with either online or hybrid formats.



Instructional Formats

Half of departments now offering *only* in-person labs.

~ 20% of departments offering dual-mode instruction.



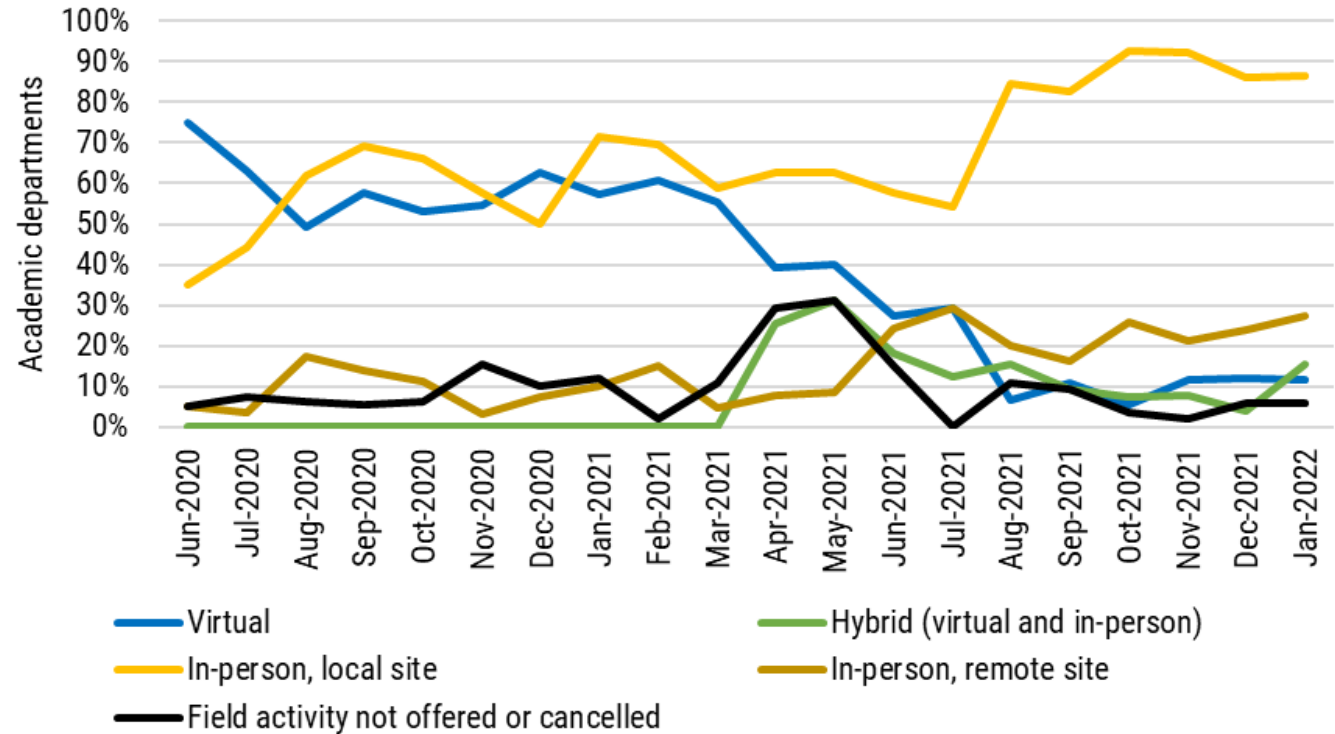
Instructional Formats

Over 90% of departments now offering in-person field instruction, primarily at local sites.

75% of departments offering only in-person field instruction.

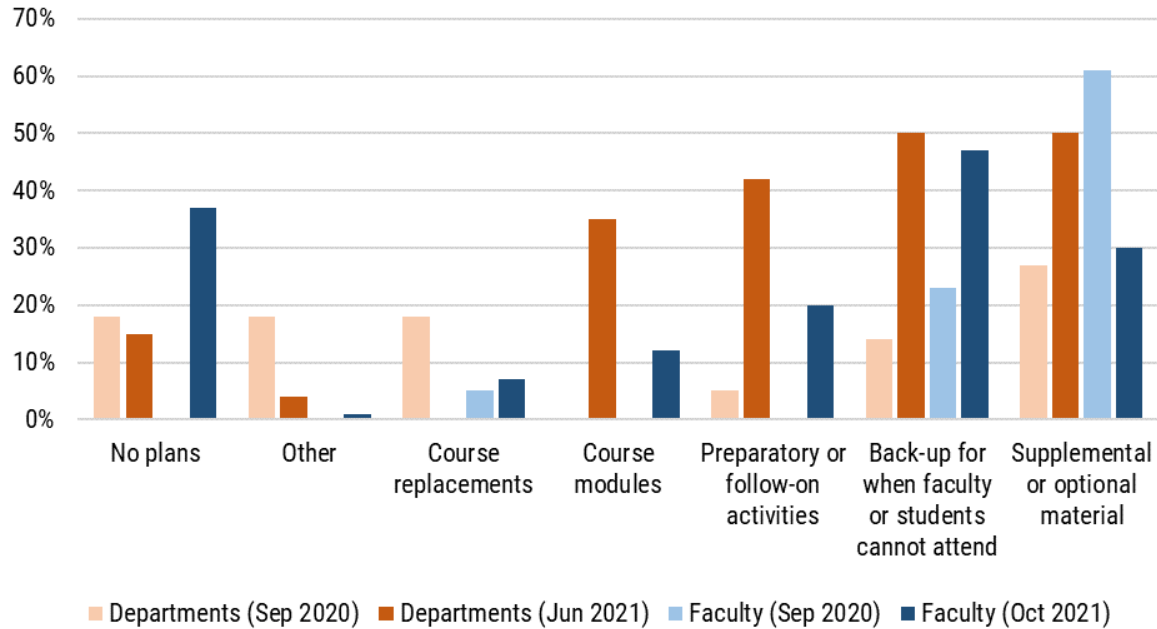
Limitations on vehicle usage and travel persist.

Formats of field activities

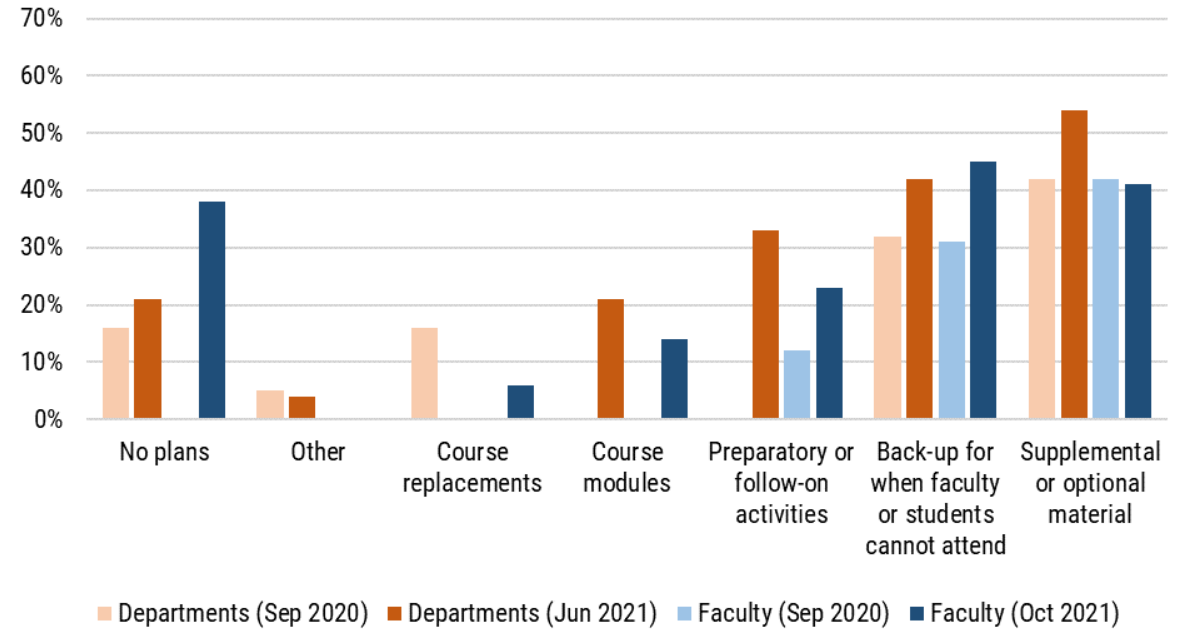


Integration of Virtual Modes

Plans to integrate virtual labs for the long term



Plans to integrate virtual field activities for the long term



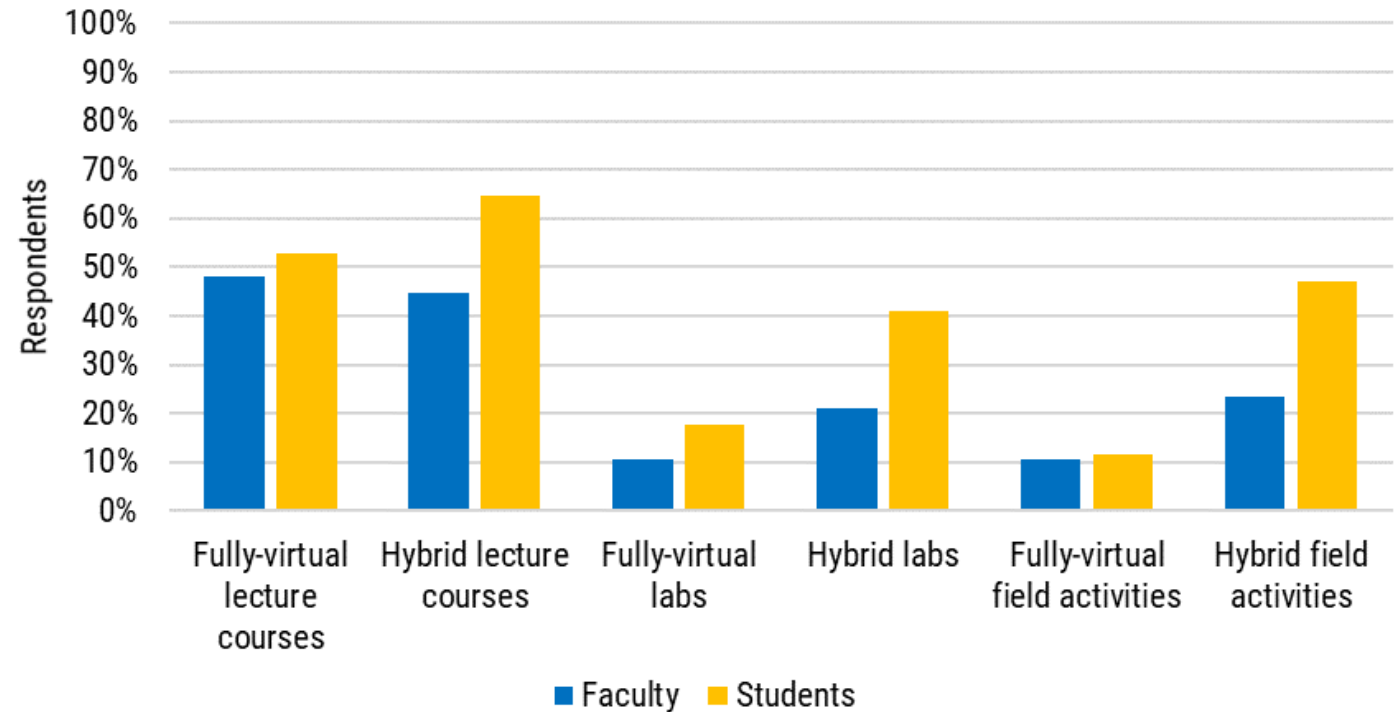
Virtual instructional activities will likely be integrated as back-up sections or as supplemental activities to in-person activities.

Interest in Virtual Instruction

Students more interested in virtual learning than faculty in virtual teaching.

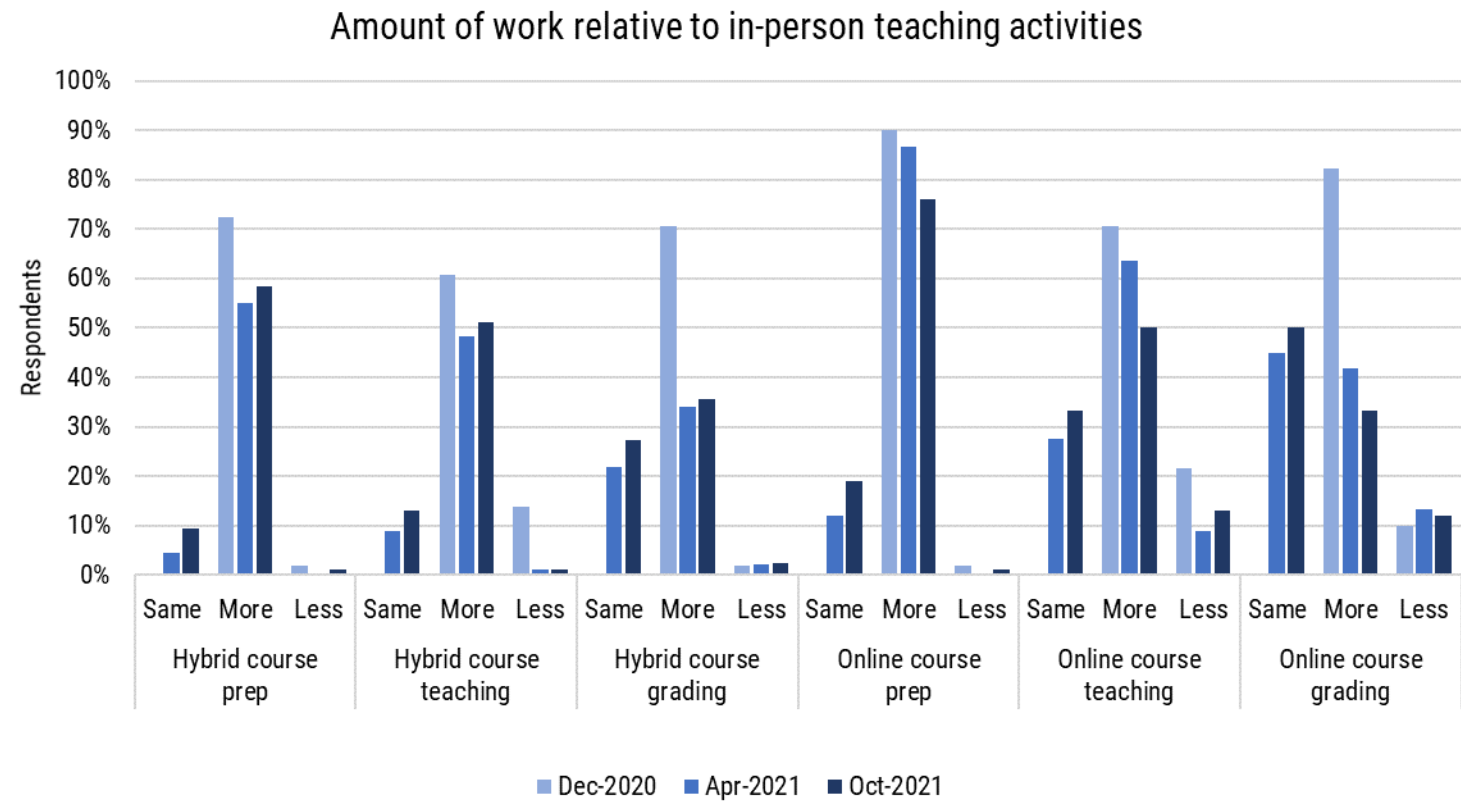
Most interest in virtual instruction for lecture courses.

Interest in teaching or learning in a virtual format, May 2021



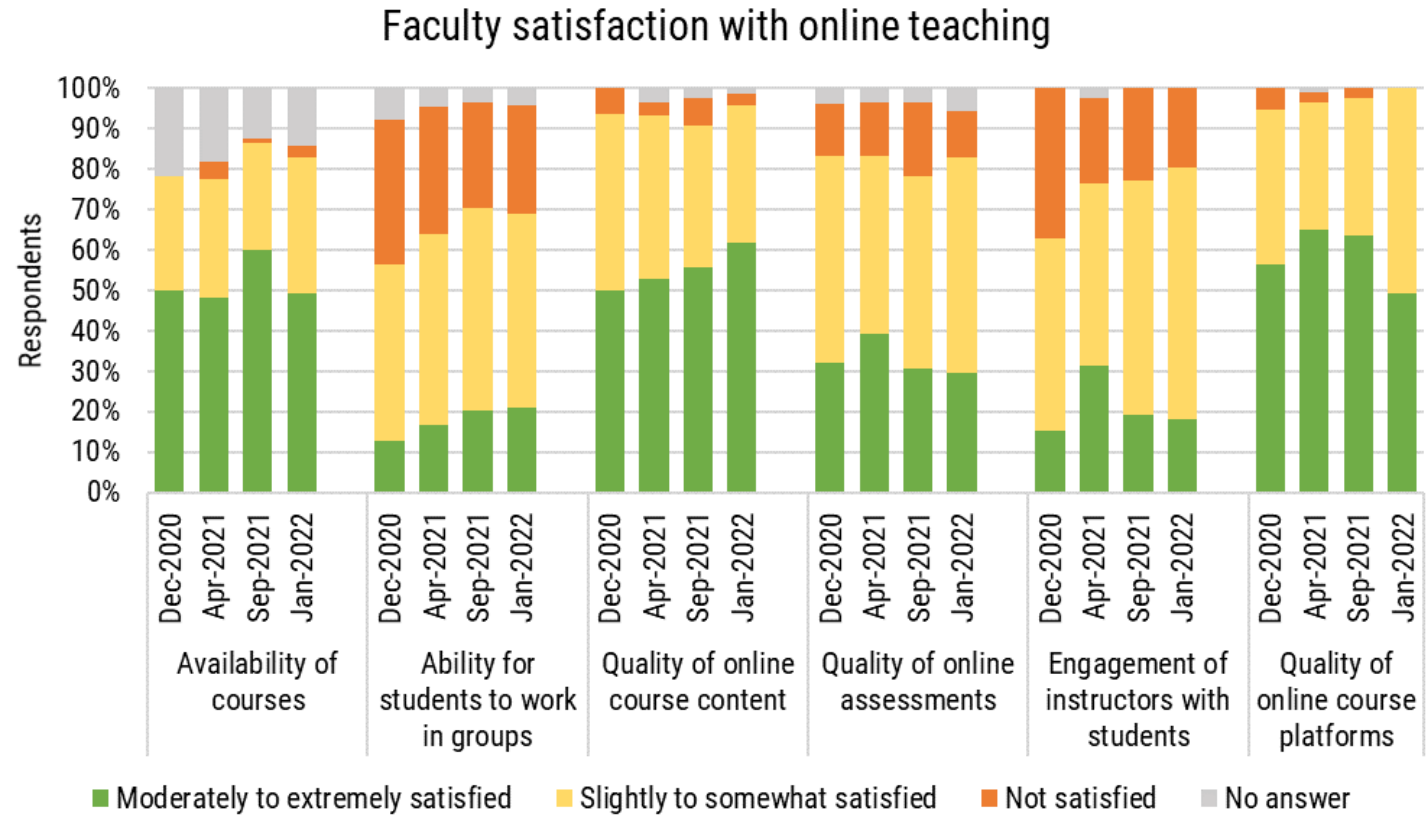
Interest in Virtual Instruction

Workloads for virtual instruction, especially course prep activities, are still more than for in-person instruction, but this has lessened since 2020.



Satisfaction with Virtual Instruction

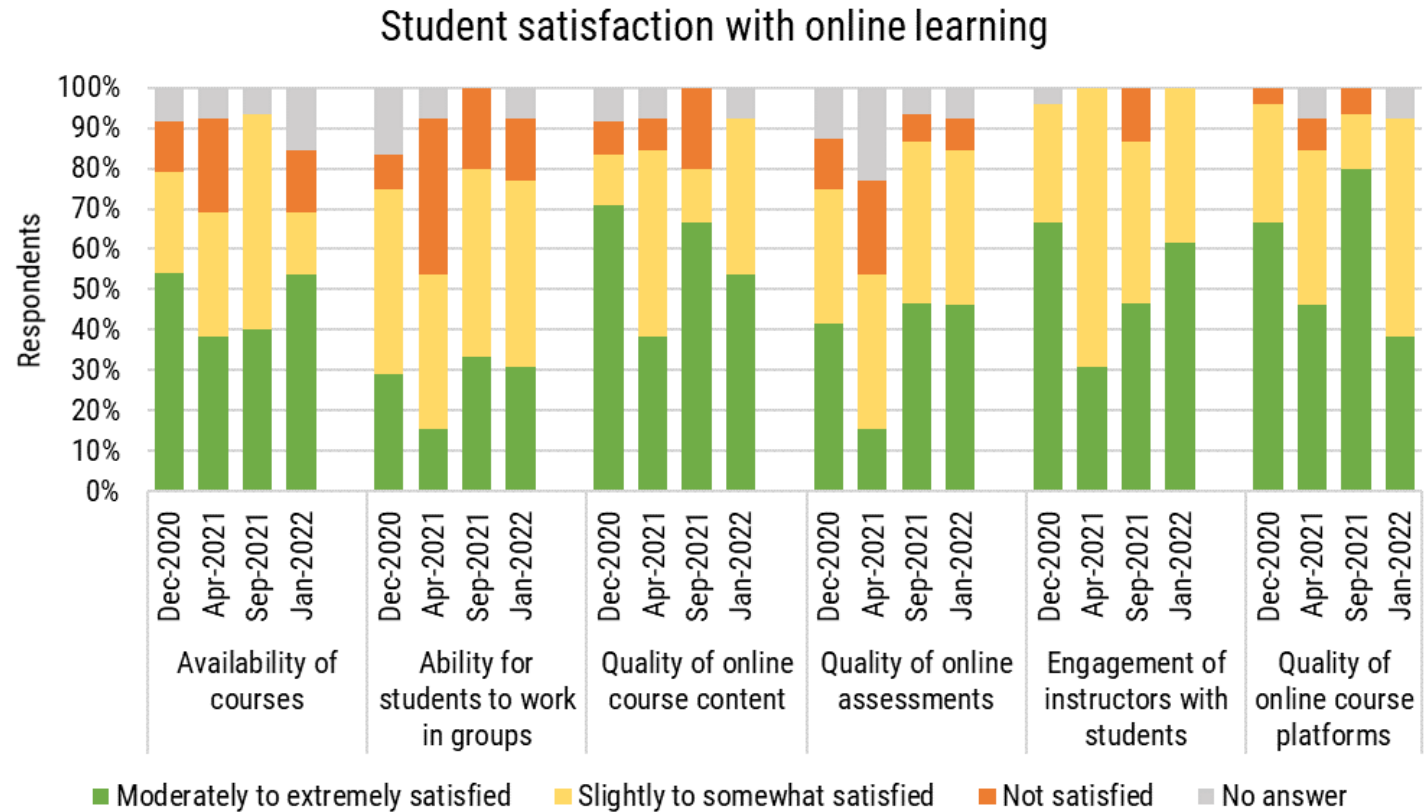
Increased satisfaction with quality of online content and with ability for students to work in groups.



Satisfaction with Virtual Instruction

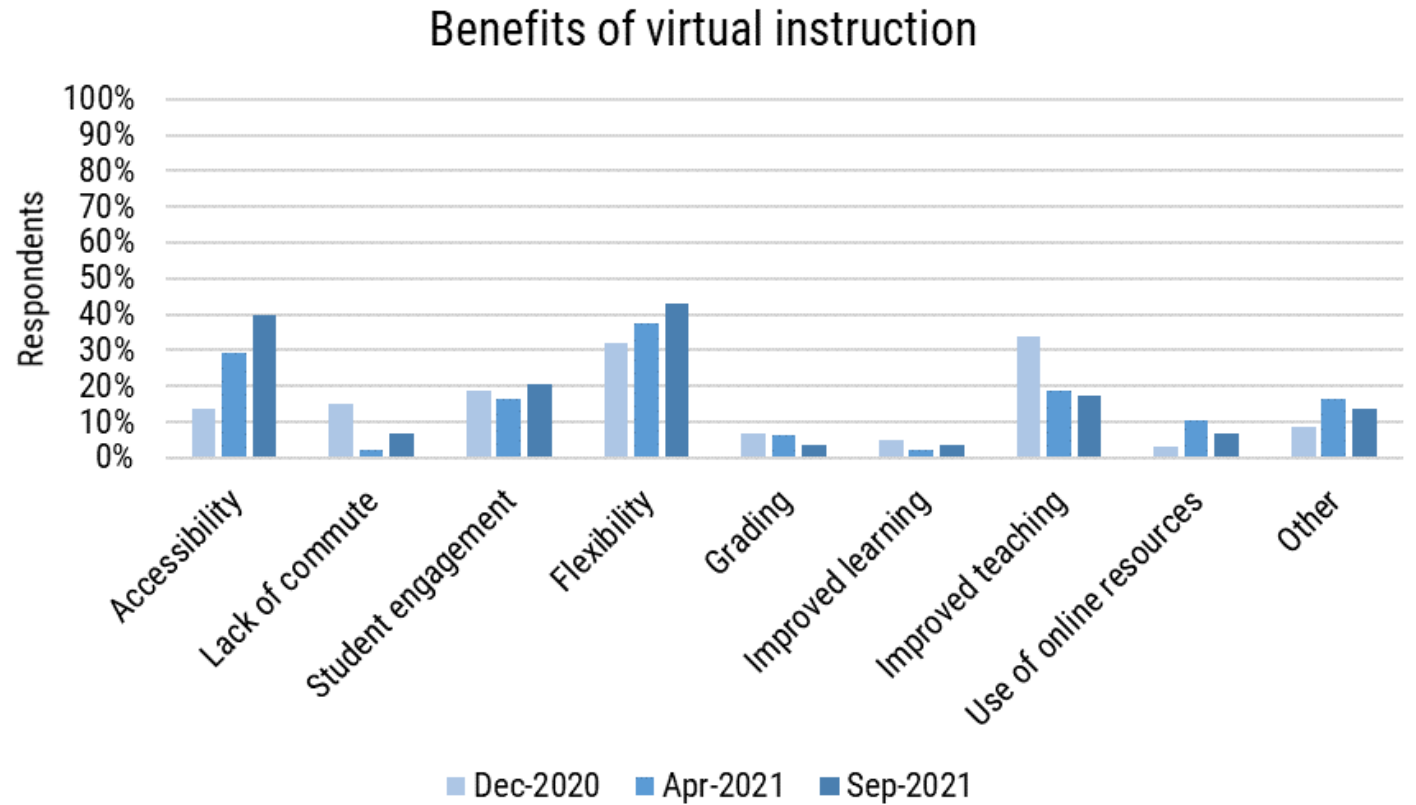
More variability with student satisfaction.

Increased satisfaction with group work, engagement with instructors and quality of online course content.



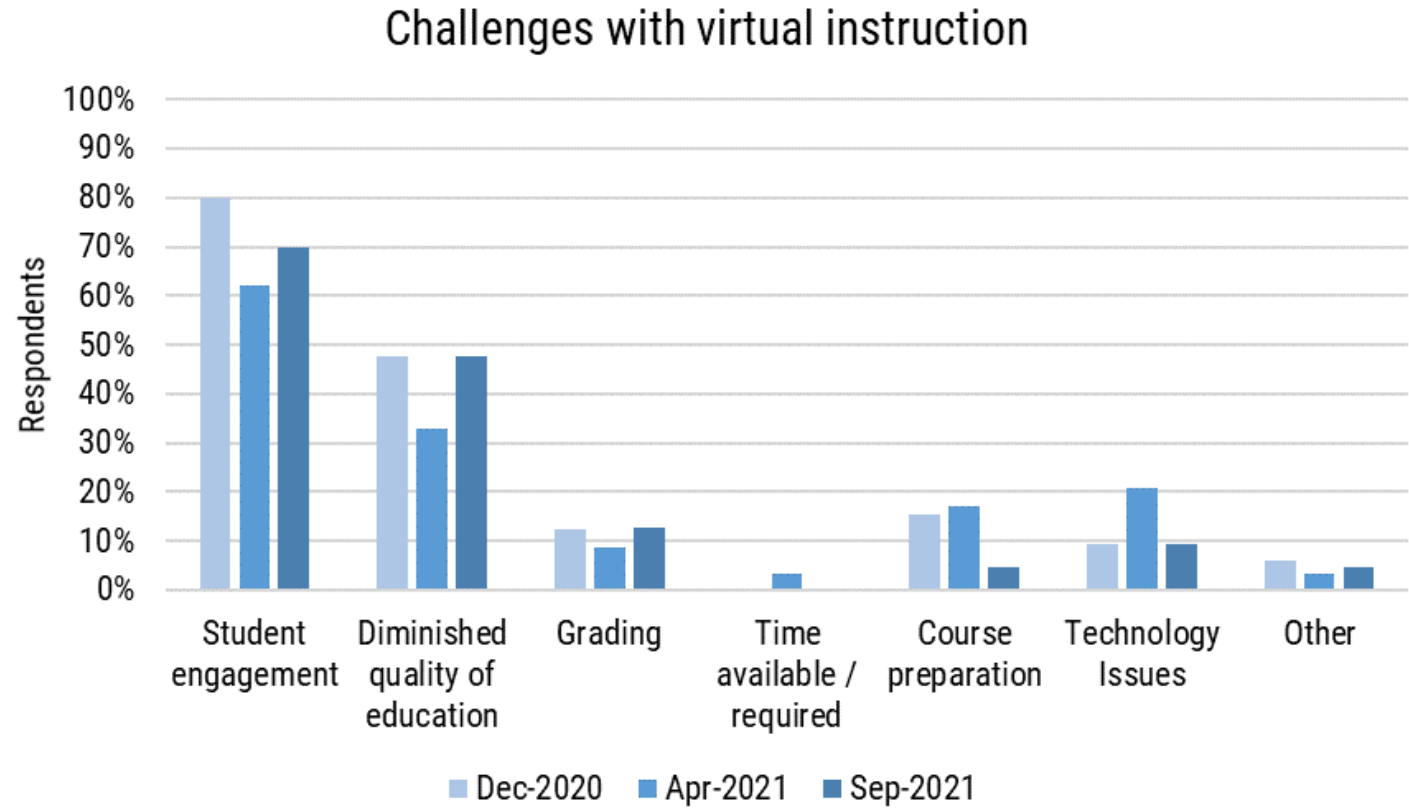
Benefits of Virtual Instruction

Largest benefit of virtual instruction is flexibility it provides especially to students for reviewing content and taking courses at their own time / pace.



Challenges with Virtual Instruction

Issues with student engagement and diminished course quality are top issues with virtual instructional activities.

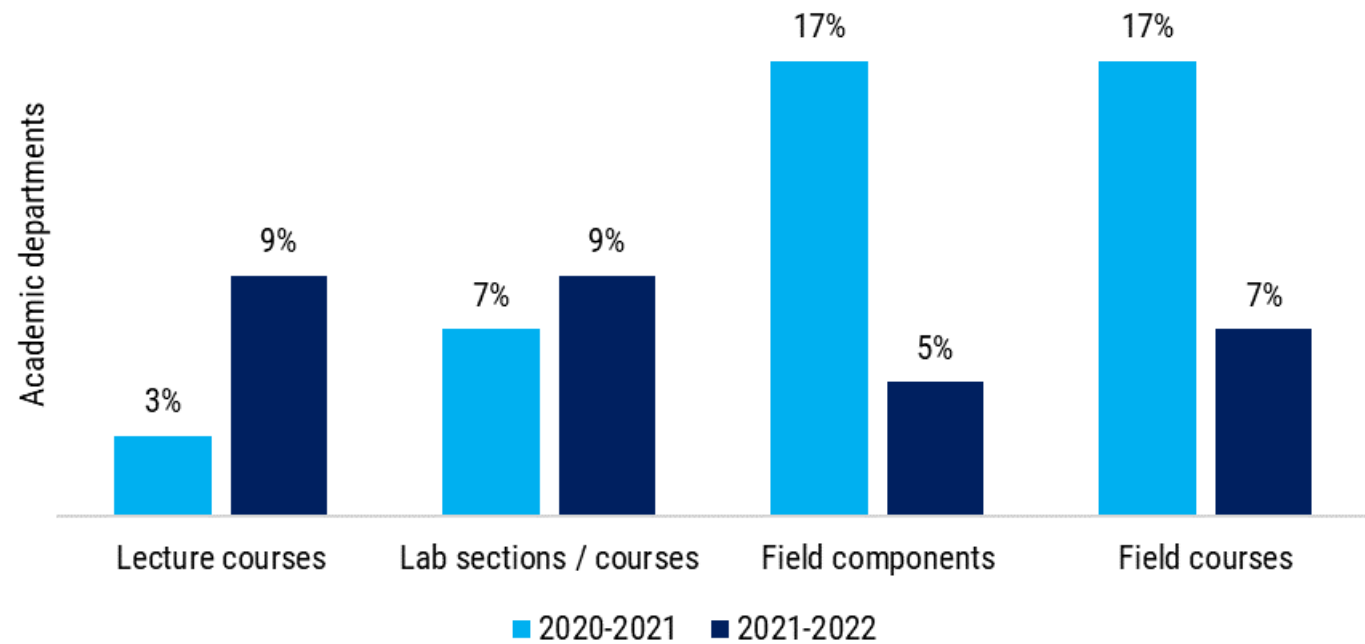


Cancelled Instructional Activities

Cancellation of field components to courses and field courses primarily due to pandemic impacts.

Cancellation of lecture and labs in 2021-2022, primarily due to low enrollments.

Geoscience instructional activities cancelled during the pandemic, by academic year



Student Impacts

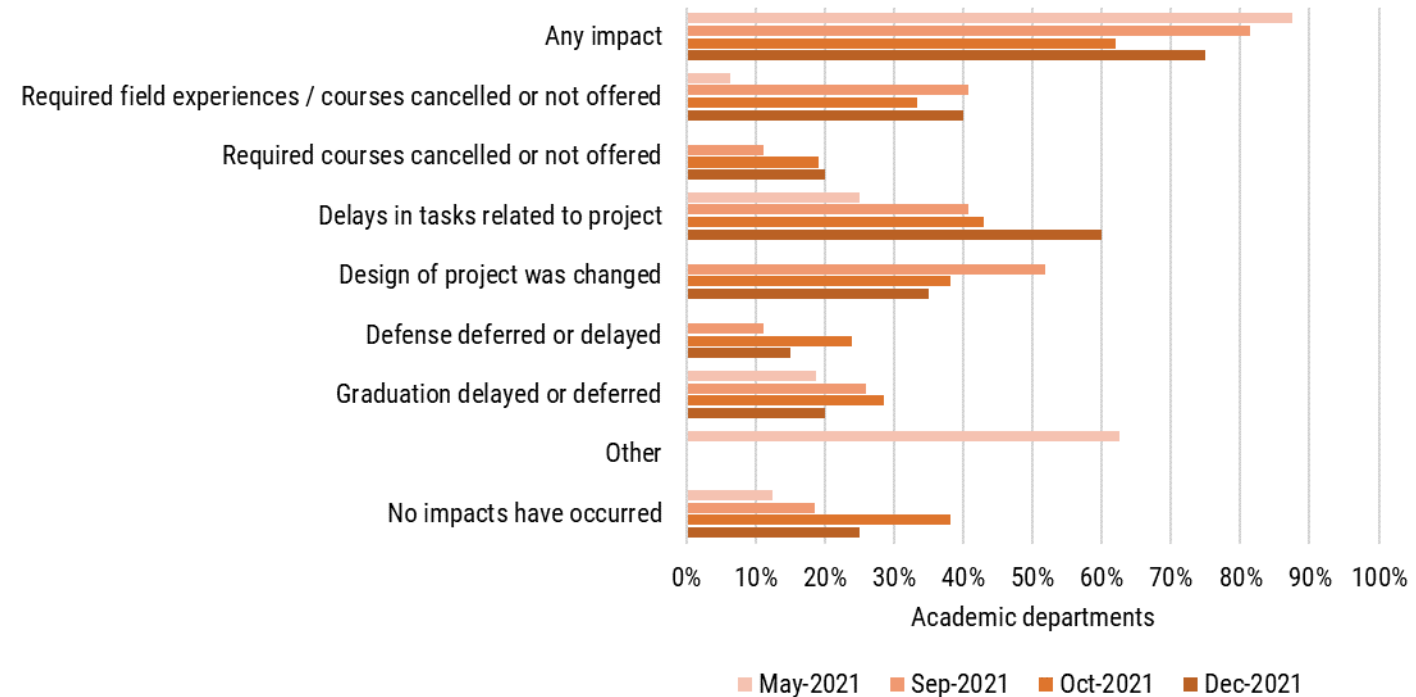
Overall percentage of departments reporting impacts is lessening.

However, there has been an increase in departments reporting students experiencing project delays.

Project re-design more prevalent in 2020-2021 AY.

Impacts to field instruction persist.

Pandemic-related impacts to degree progress reported by academic departments



Student Impacts

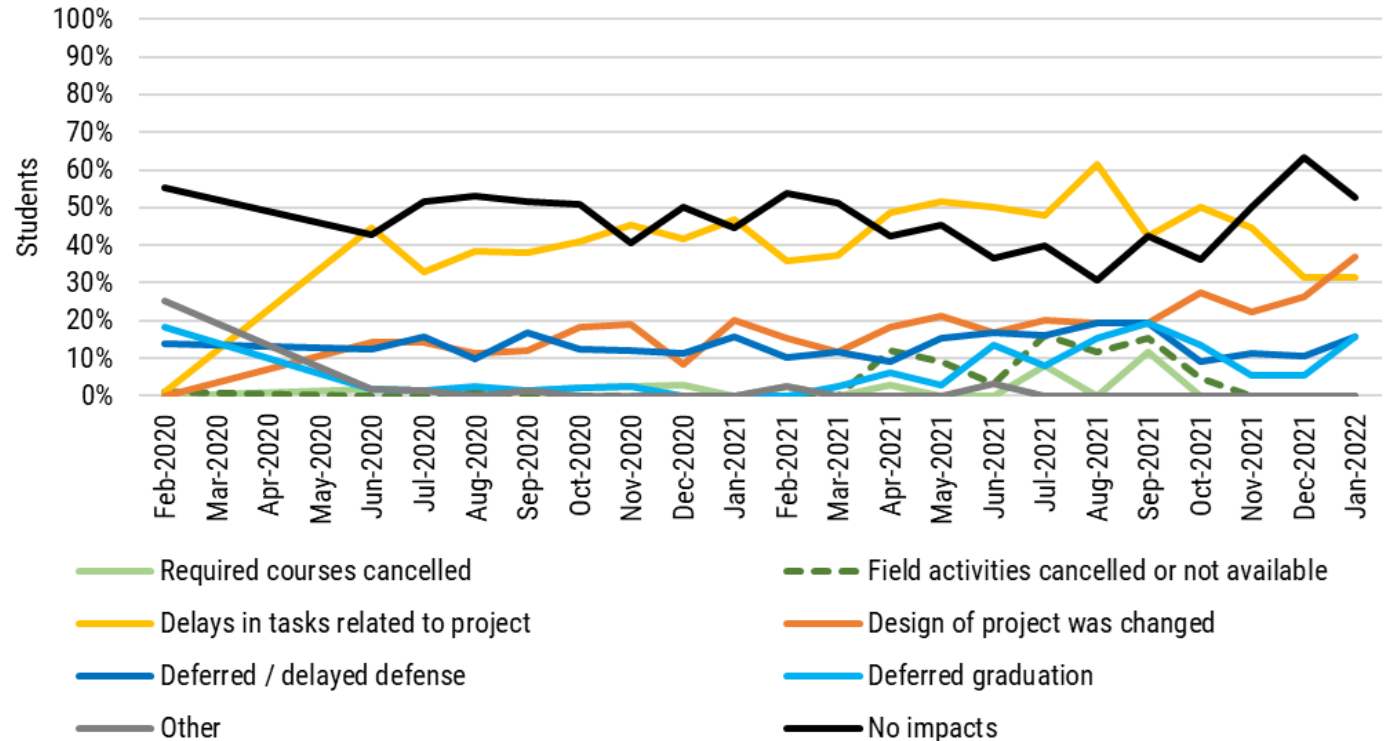
Delays in thesis, dissertation and capstone projects is the top reported issue.

Impacts to field instruction especially during 2021 field season.

Increase in students reporting changes to project design.

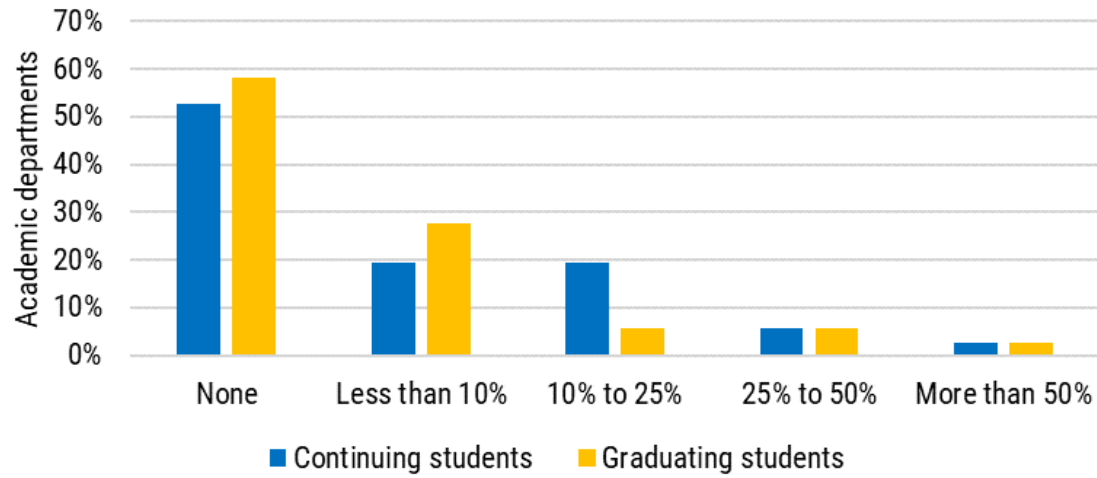
Students also delaying defense / graduation due to project delays and availability of field instruction.

Student reported degree completion impacts

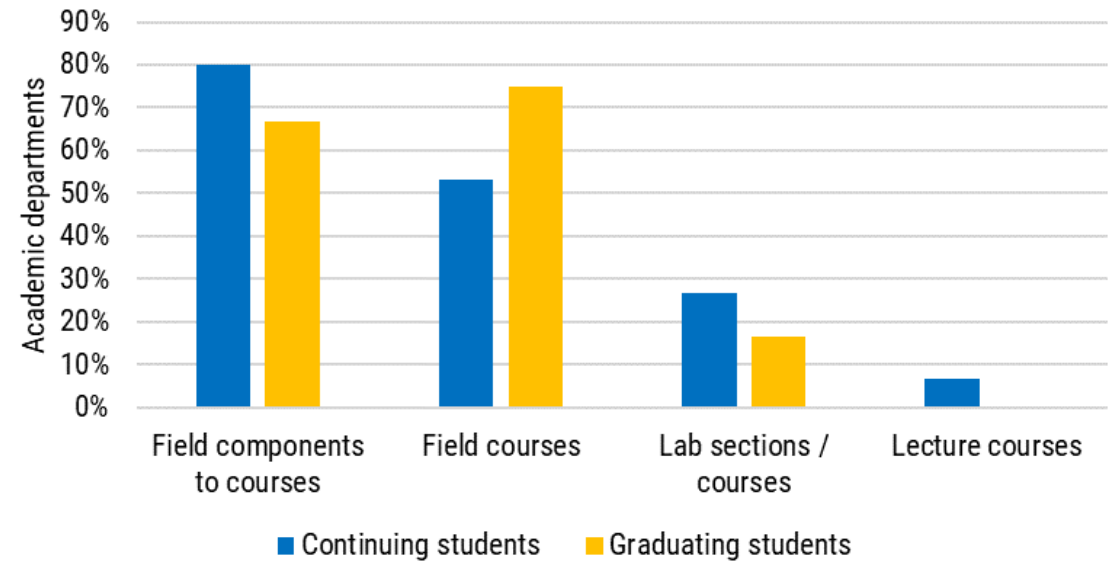


Student Impacts

What percentage of geoscience majors in your department were unable to take required courses during the 2020-2021 academic year?



What types of courses were students not able to take?



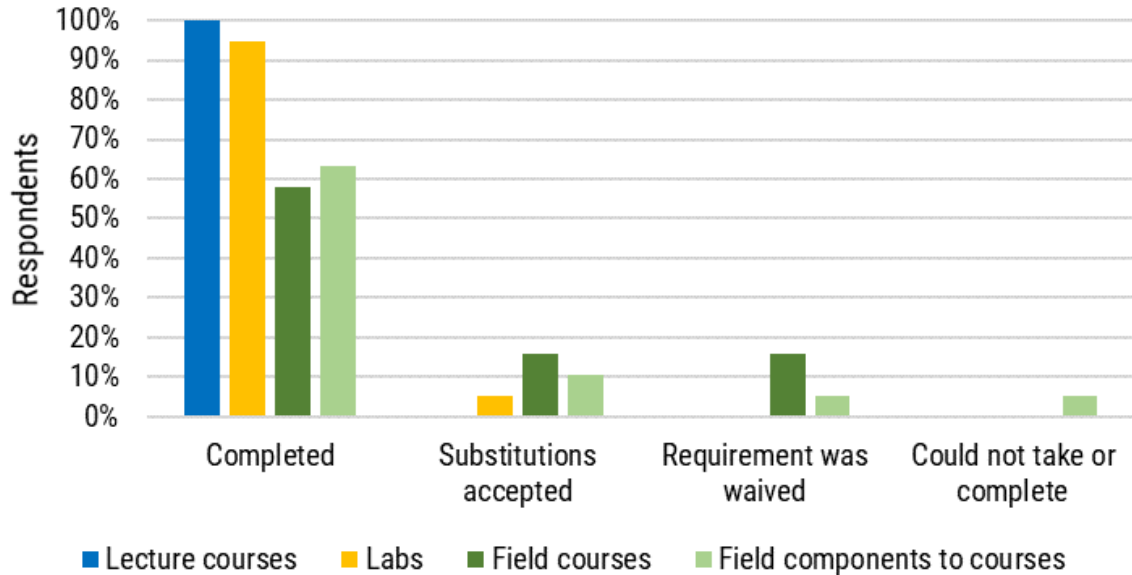
Course topics were primarily field methods, but also included mineralogy, sedimentology, and structural geology.

Departmental Actions

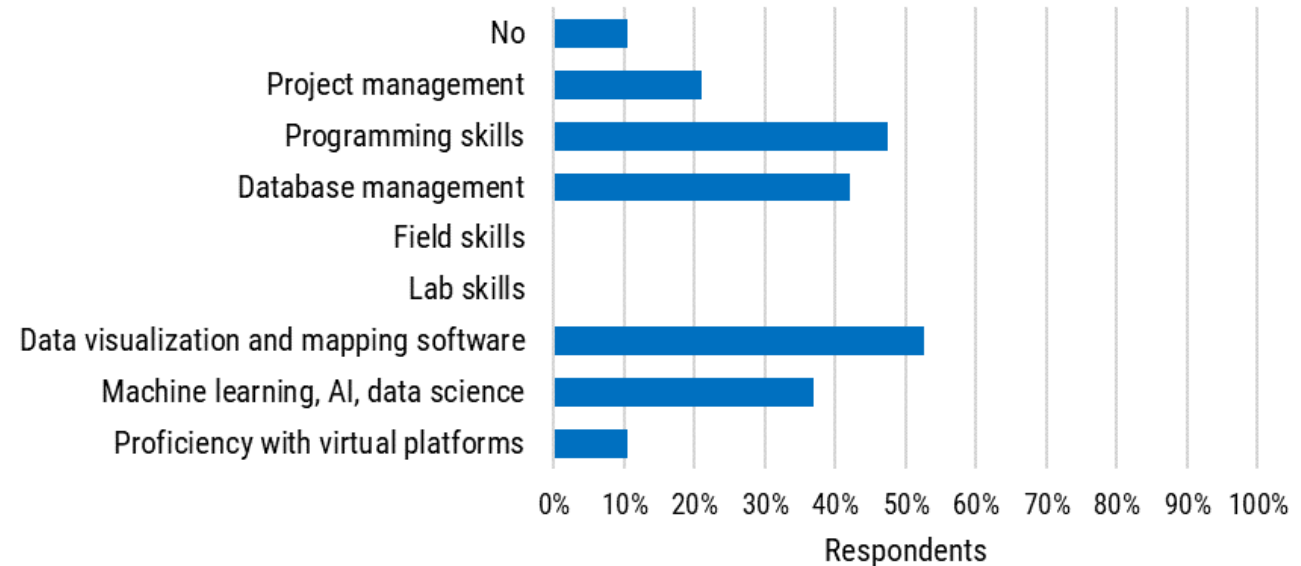
- Continuing students
 - Acceptance of substitutions for courses
 - Waivers for pre-requisites, make-up courses / directed studies
 - Spaces in 2021-2022 field courses offered first to students who were unable to take prior year's course
 - Postponed degree progress
- Graduating students
 - Waived field course requirements
 - Delay of graduation until students could take in-person field course
 - Make-up courses / independent studies to fulfill field course requirement

Pandemic Graduates

How did you handle courses that were required for your degree completion?



Are there skills and/or knowledge that you wish you had acquired prior to graduation?

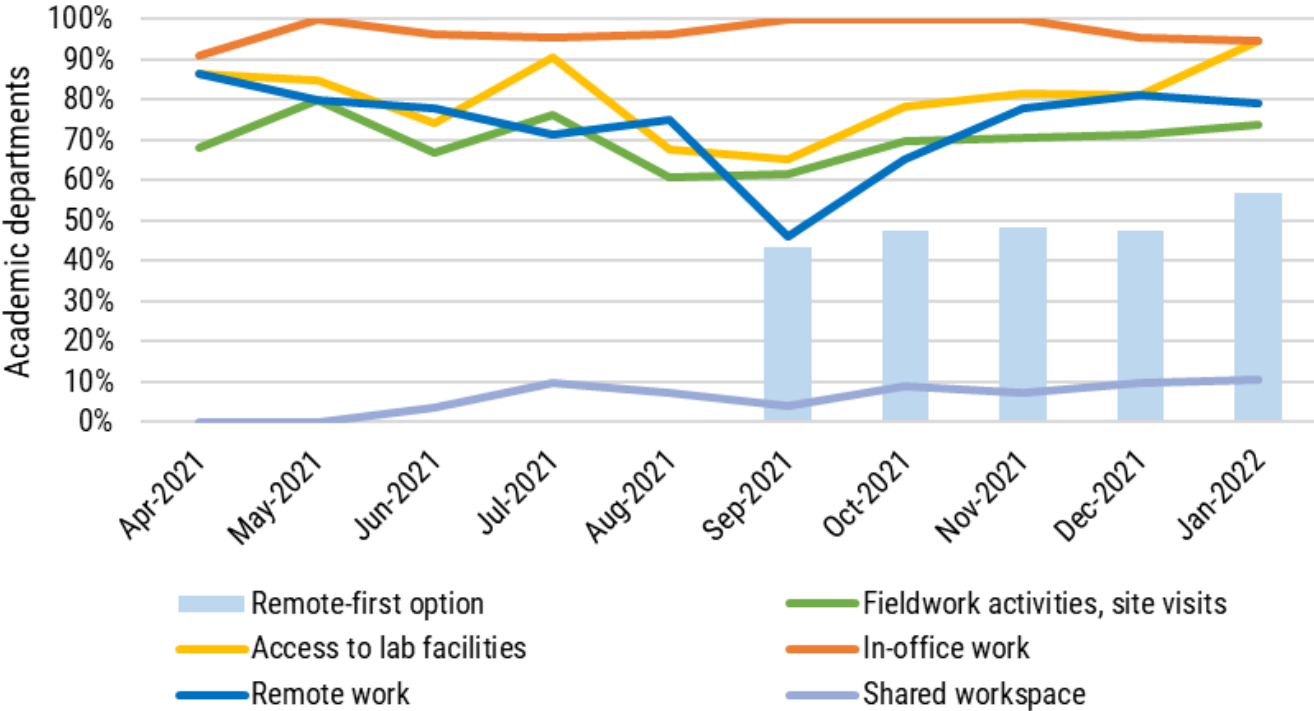


Most graduates acquiring skills via self-taught instruction or via on-the-job training.

Workplace policies

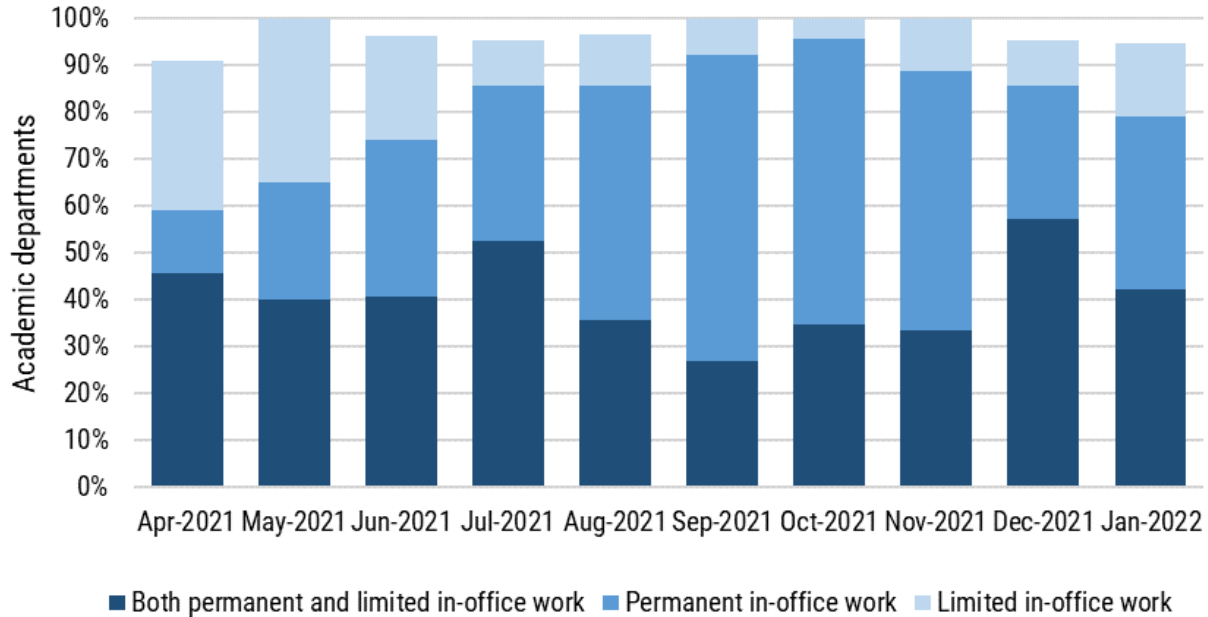
Just over half of departments offer remote-first policies for faculty and staff.

Workplace policies available to faculty and staff

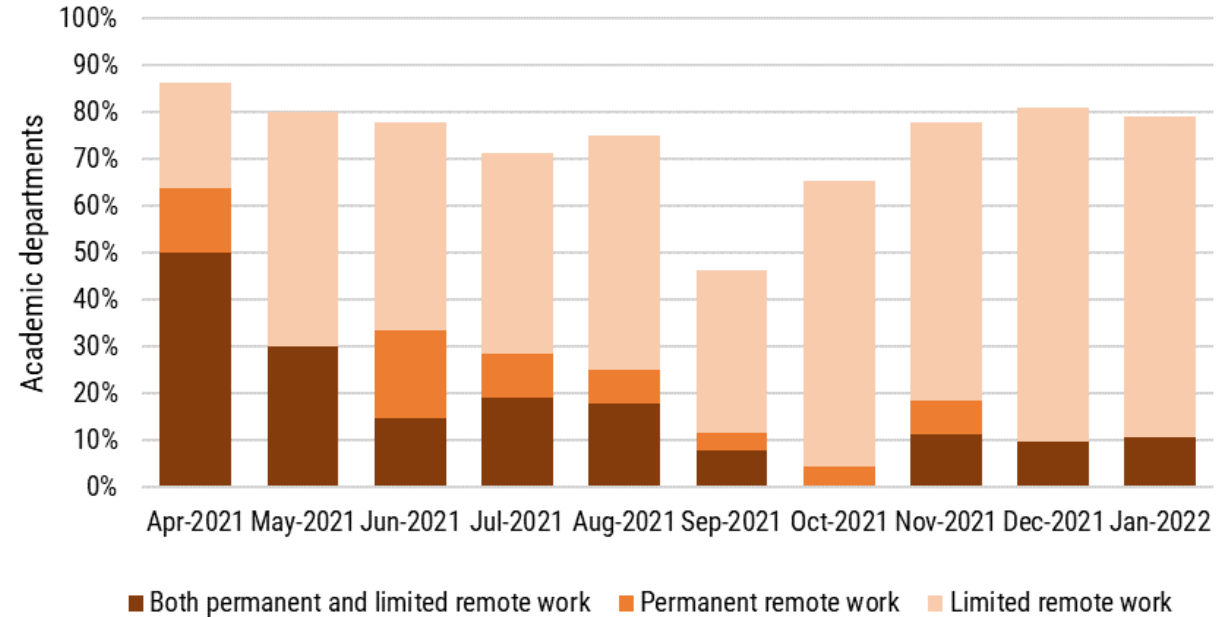


Changes in work policies

In-office work policies available to faculty and staff



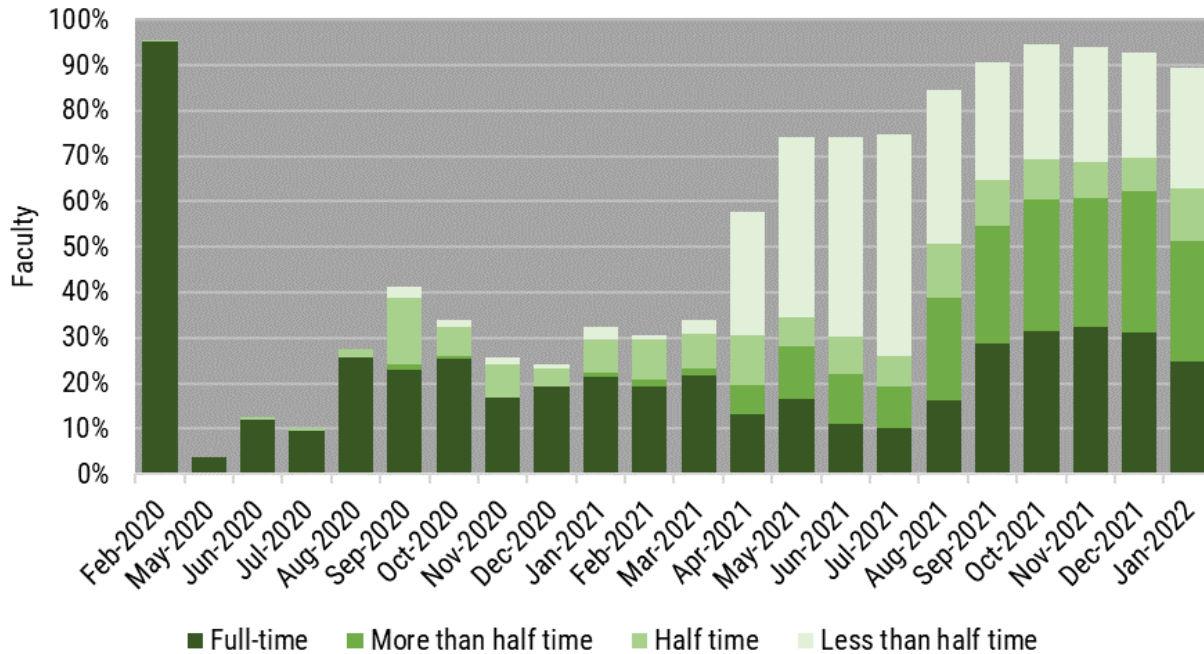
Remote work policies available to faculty and staff



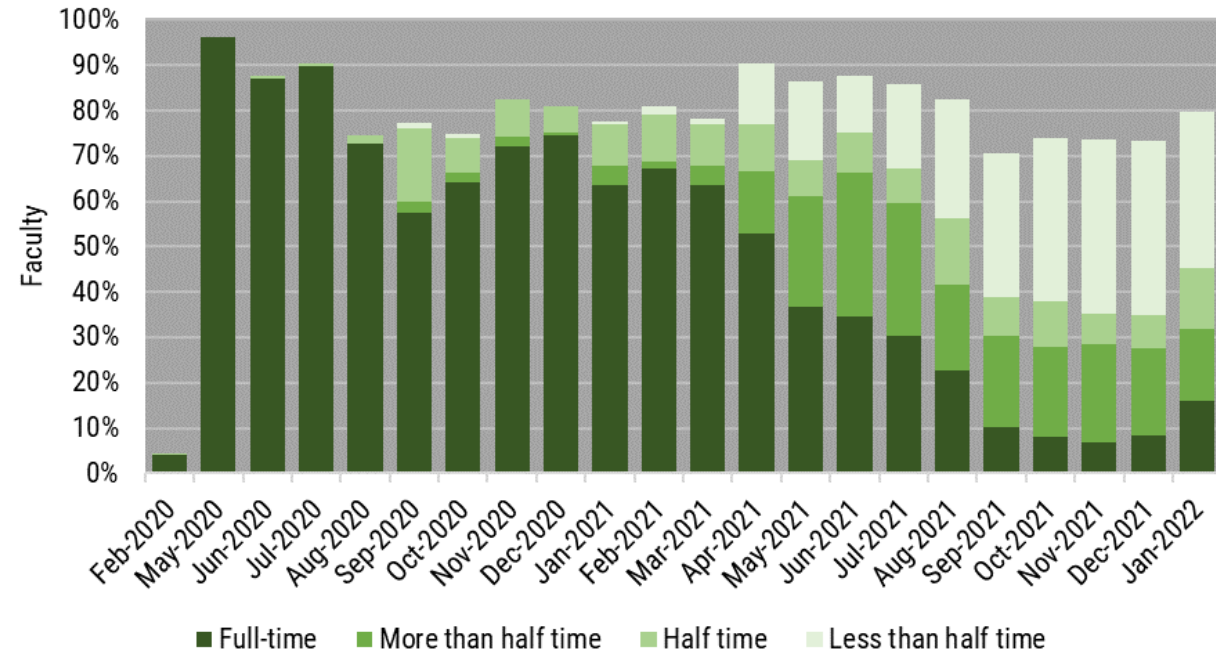
Change in remote work policies to more of a focus on limited remote-work

Changes in work location

Time spent at office



Time spent at remote work location



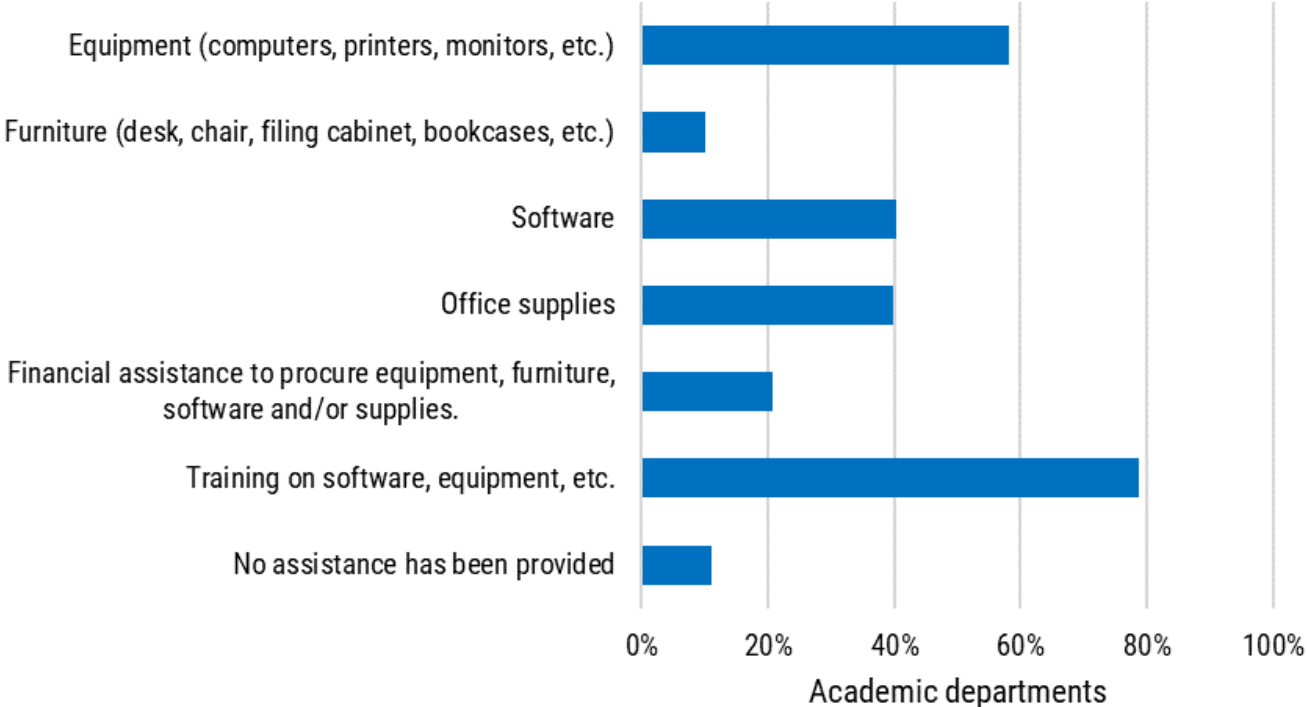
Most faculty now working in the office at least half time. Work location appears to be responsive to pandemic situation.



Work-at-home assistance

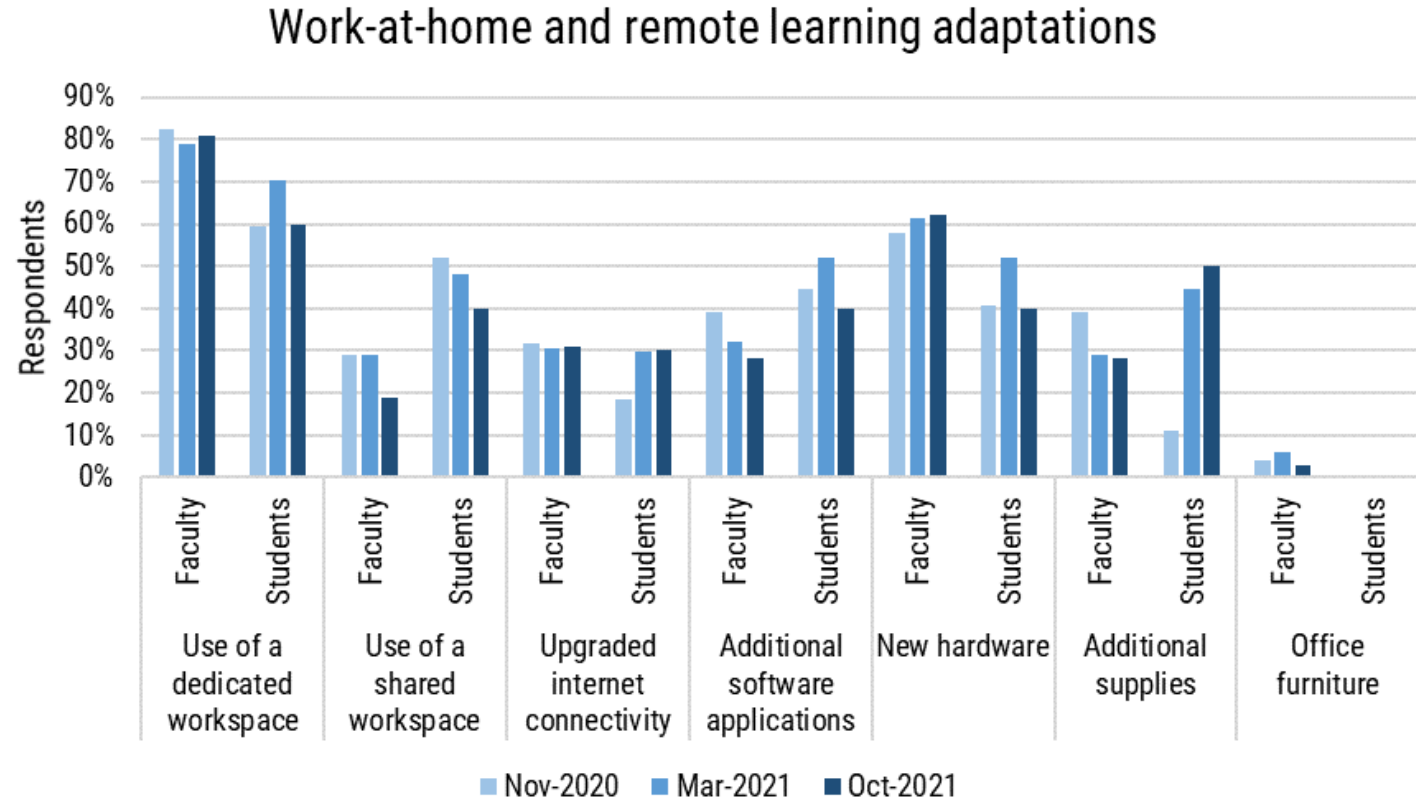
Most departments provided equipment and training for faculty and staff.

Work-from-home assistance provided for faculty and staff



Remote teaching / learning adaptations

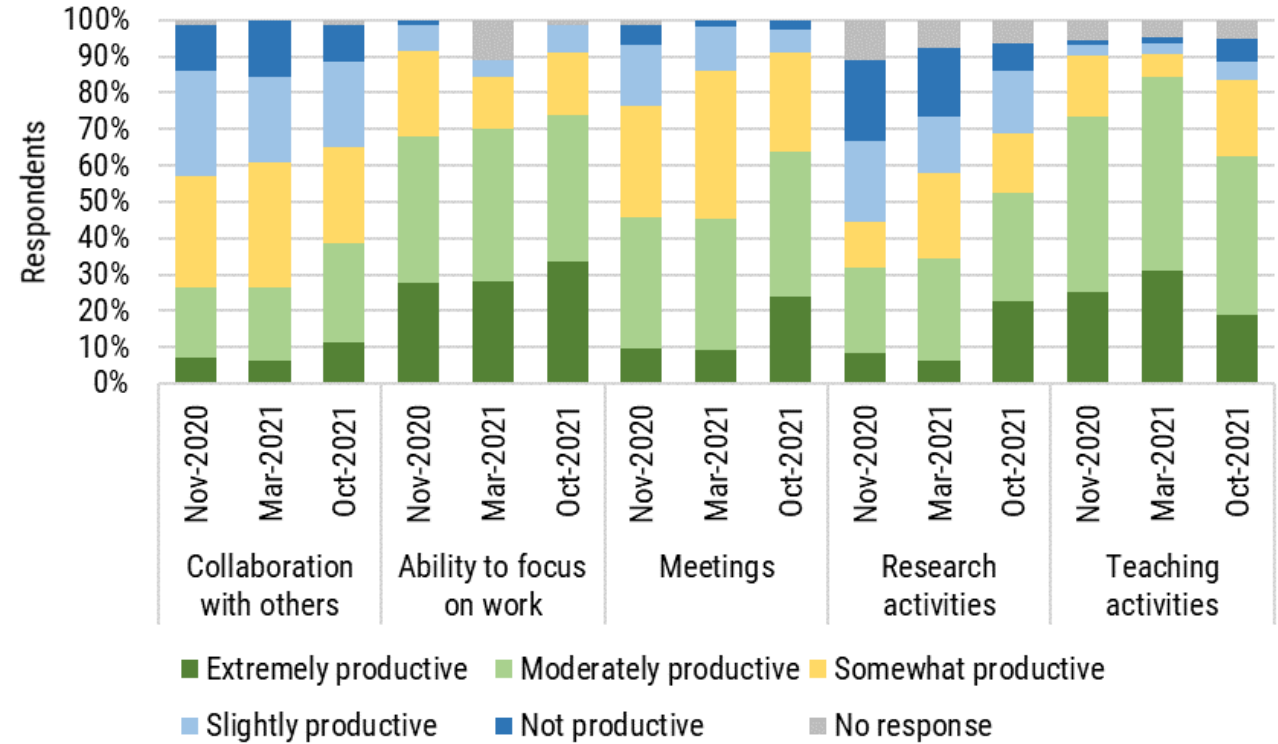
Students more likely to have a shared workspace for remote learning, but this has decreased since 2020.



Remote teaching productivity

General increase in productivity across all categories except for teaching.

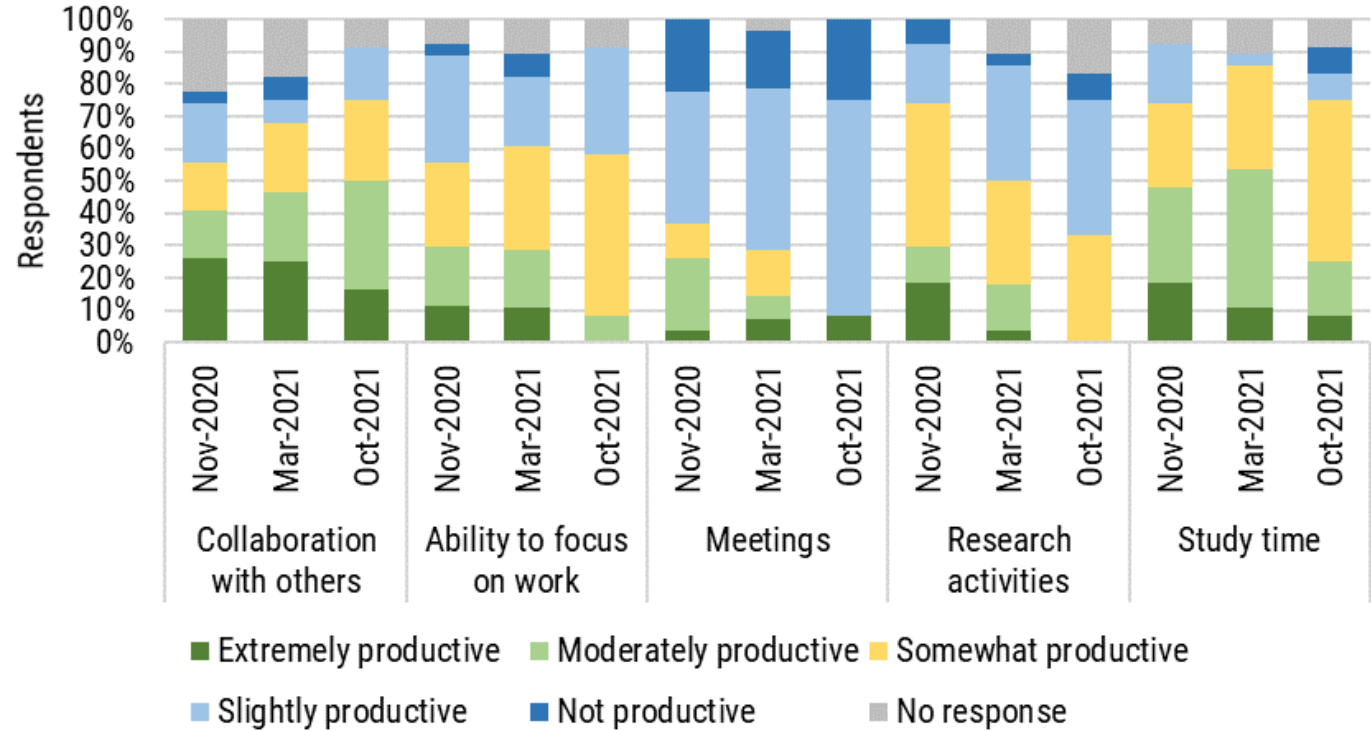
Faculty: Productivity level with remote work activities



Remote learning productivity

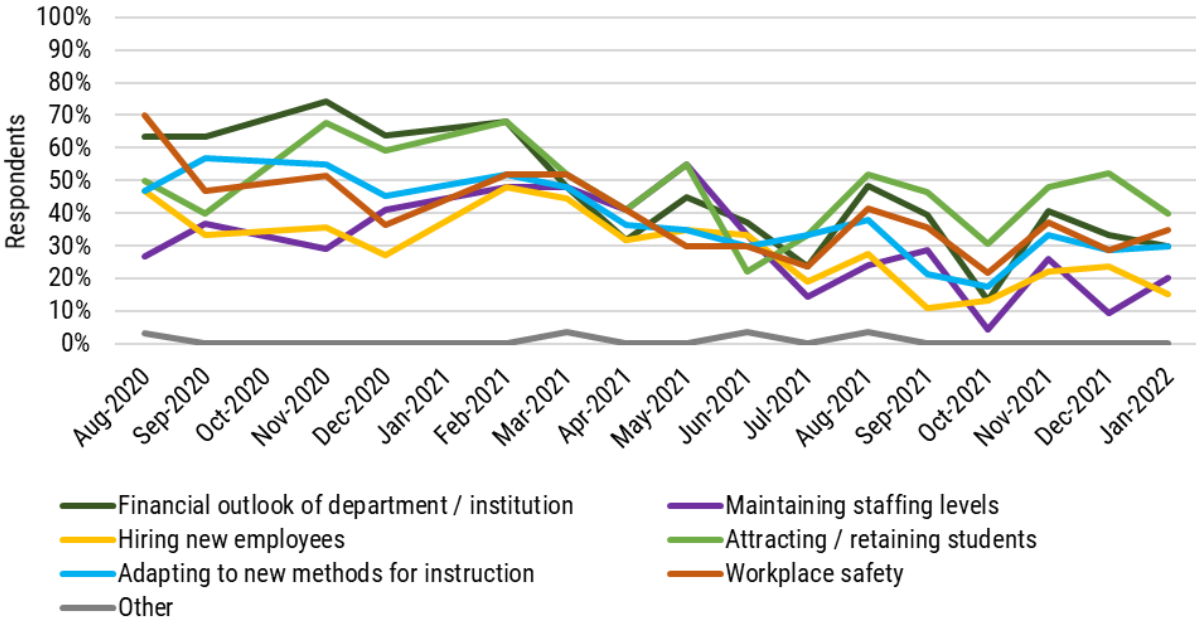
General decrease in productivity across most categories, possibly due to graduating cohort of 2020-2021.

Students: Productivity level with remote learning activities

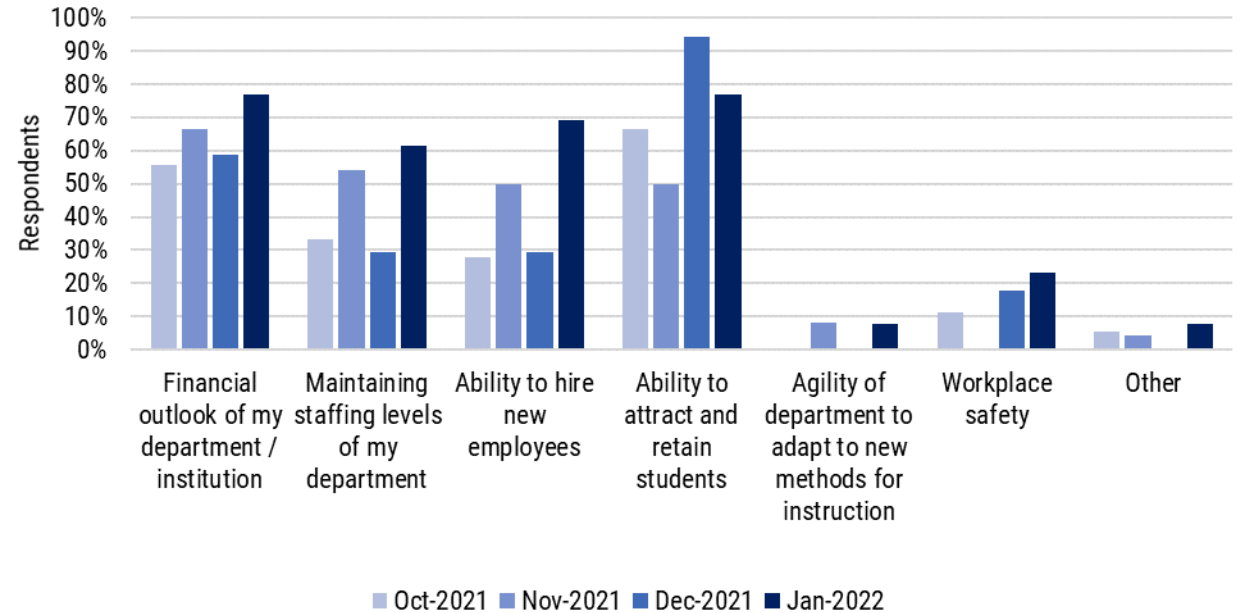


Departmental Concerns

Concerns of geoscience departments moderately to extremely driven by COVID-19



Concerns of geoscience departments not related to COVID-19

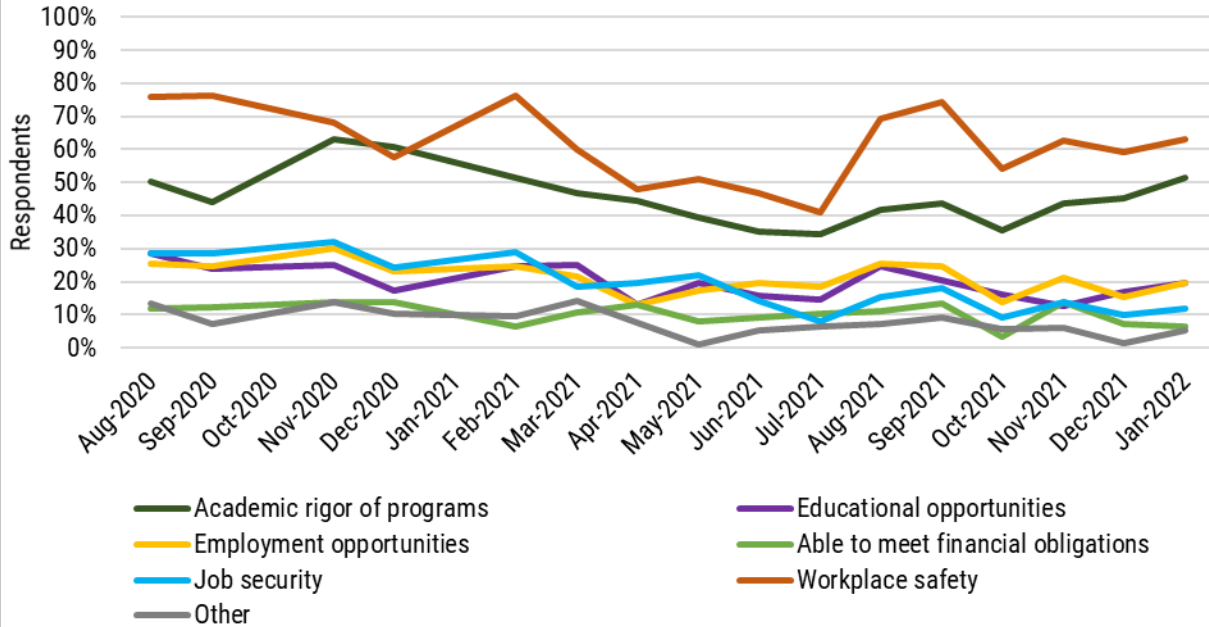


Student recruitment and retention is an increasing concern, as are budgets and staffing.

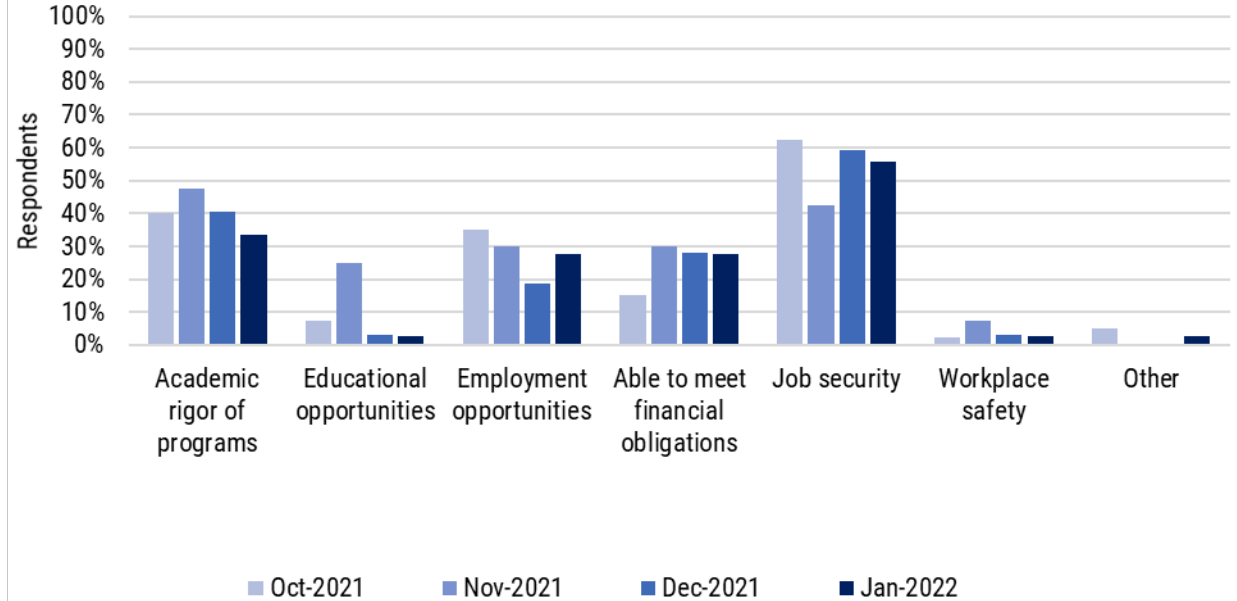


Faculty Concerns

Concerns of geoscience faculty moderately to extremely driven by COVID-19



Concerns of geoscience faculty not related to COVID-19

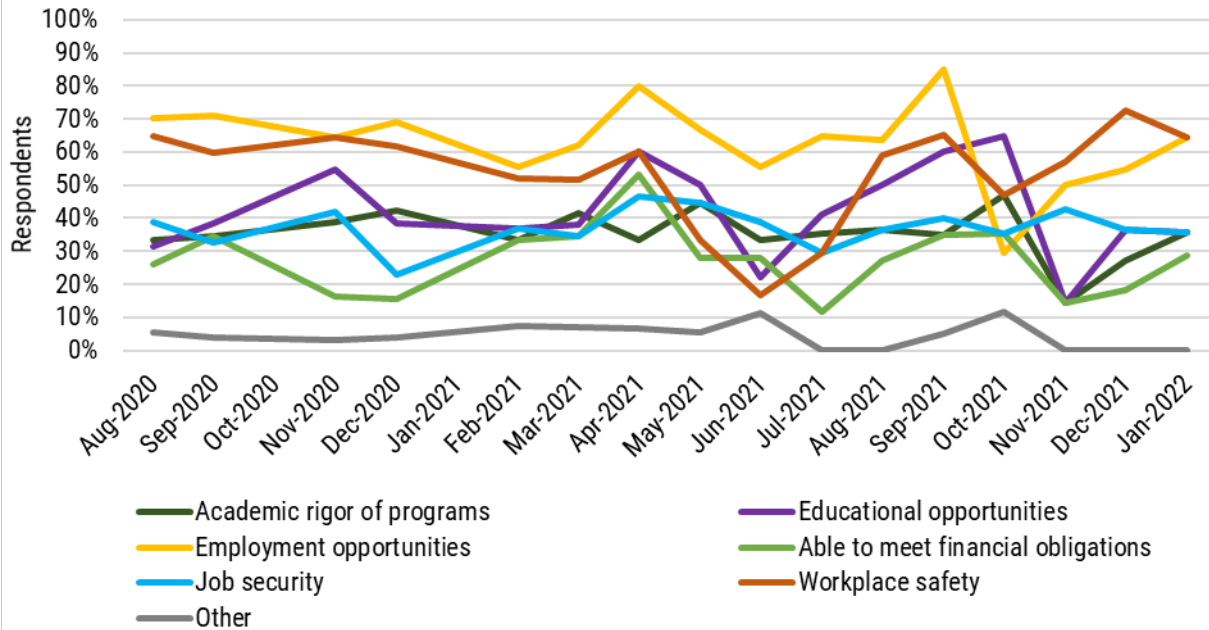


Workplace safety and academic rigor of programs continue as a pandemic-related concern. Job security is top non-pandemic concern for faculty.

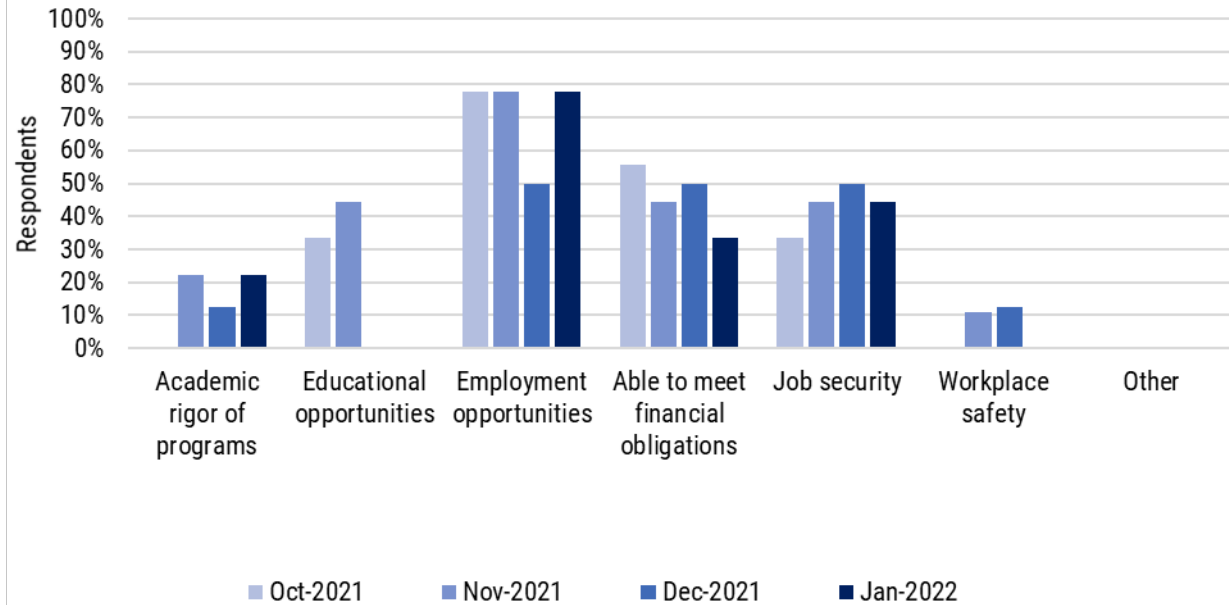


Student Concerns

Concerns of geoscience students moderately to extremely driven by COVID-19



Concerns of geoscience students not related to COVID-19



Workplace safety and employment opportunities continue as top pandemic-related concerns. Employment opportunities are also top non-pandemic related concern

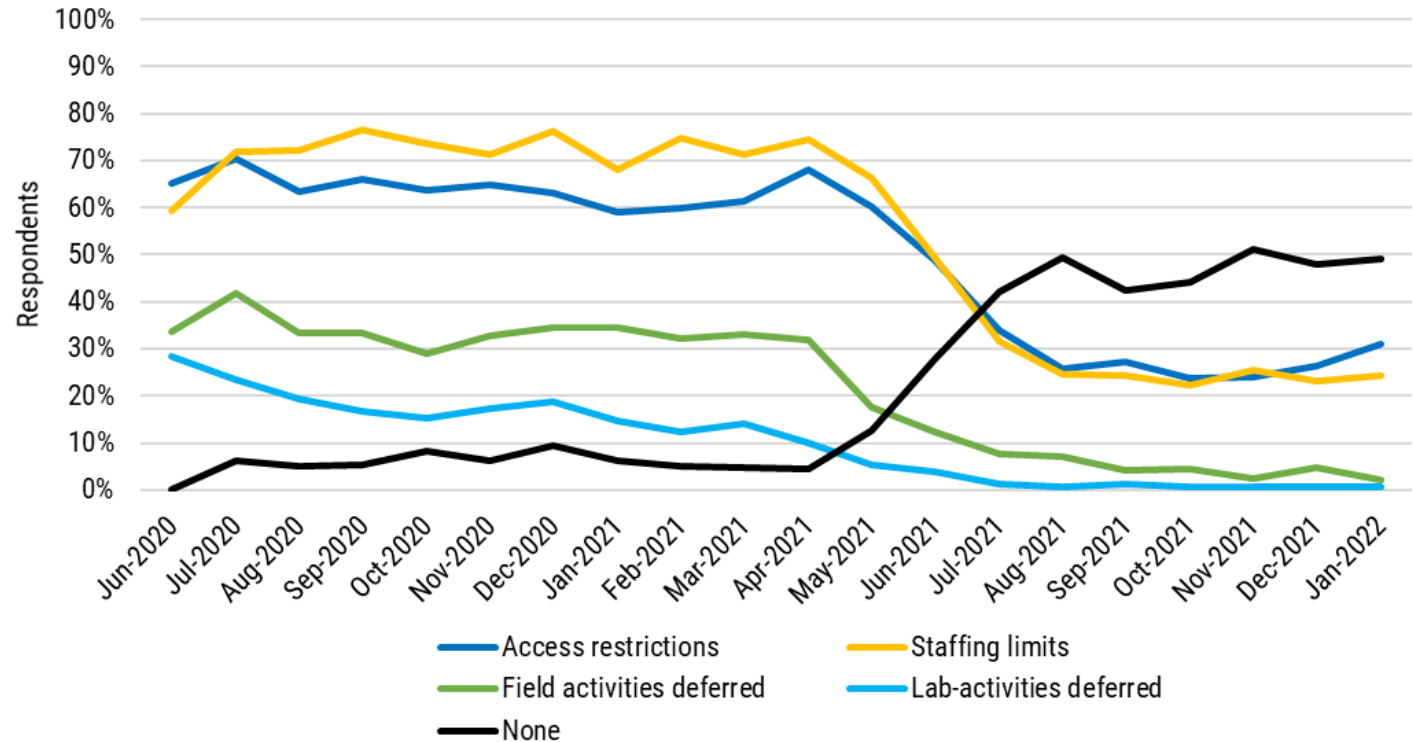


Pandemic-related restrictions

Restrictions for facilities and field activities have substantially lessened.

Limitations on staffing and access still persist for some students and faculty.

COVID-19 related facility restrictions for faculty and students

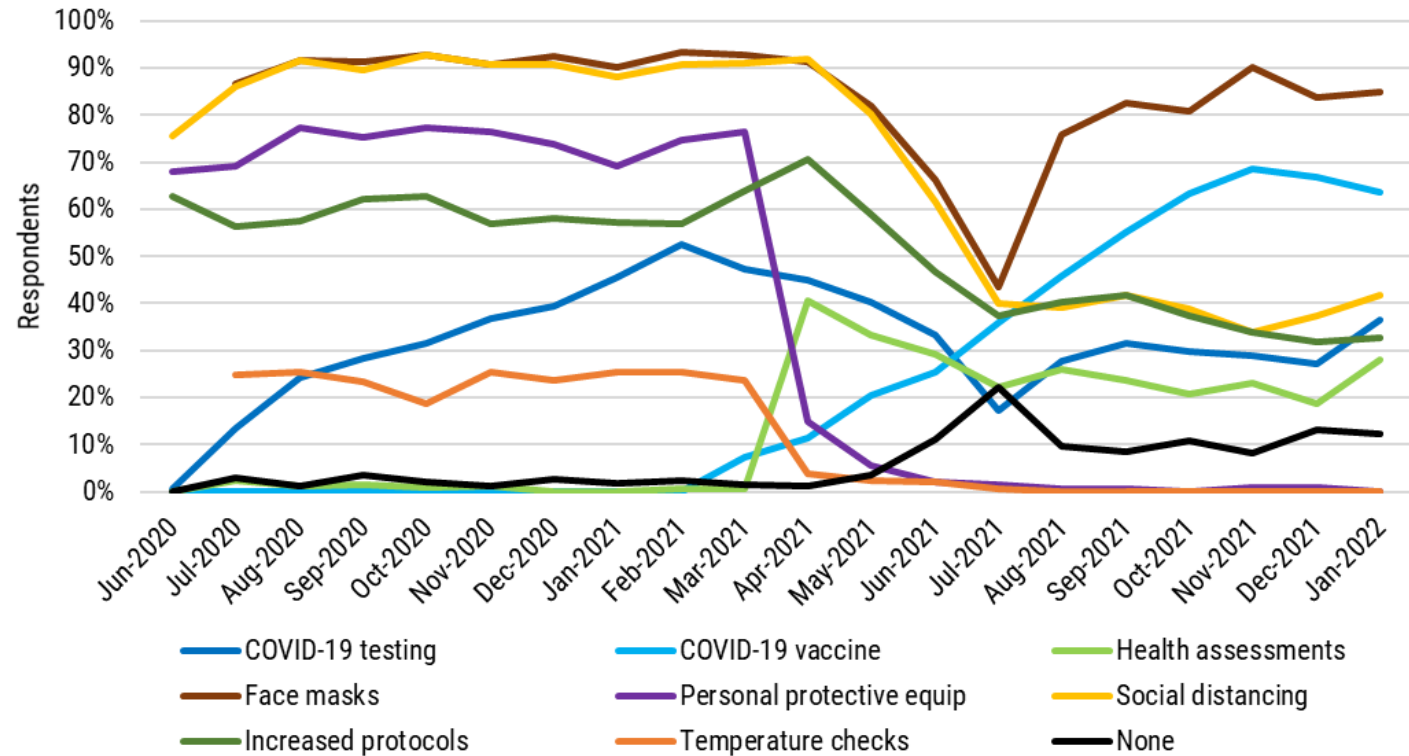


Pandemic-related restrictions

Restrictions related to health and safety are still in place for most faculty and students.

Most common restrictions are related to masking, vaccines, and social distancing.

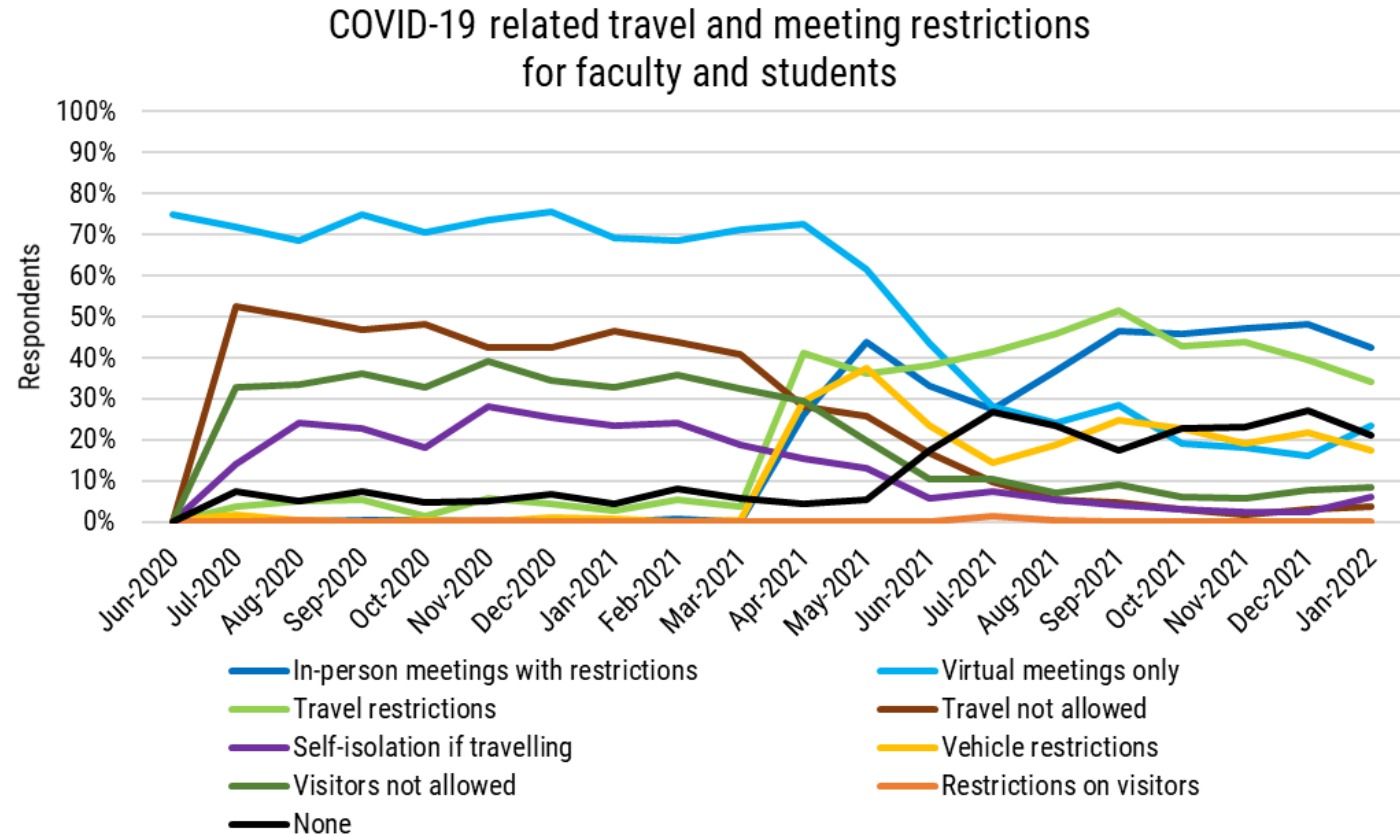
COVID-19 related health restrictions for faculty and students



Pandemic-related restrictions

Restrictions for travel and meetings have lessened.

Restrictions on in-person meetings and travel limitations are most common restrictions.

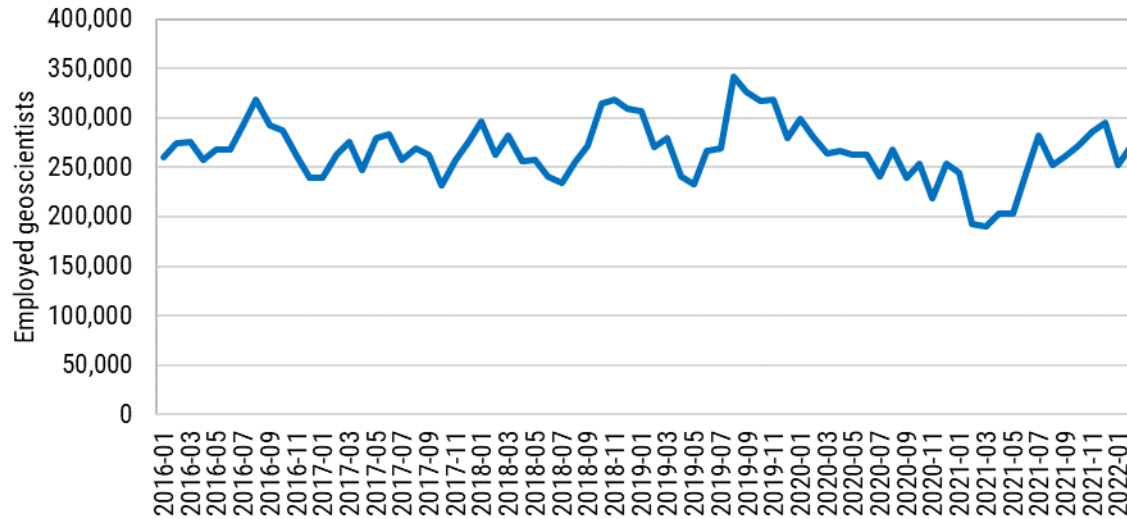


Ongoing questions

- **Which instructional modes will be integrated long-term?**
 - Will departments provide direction or will it up to faculty?
 - How widespread will be the adoption of virtual lab and field components? What factors will lead to their adoption?
 - Will virtual instruction be used as recruiting tools?
- **Will pandemic-related accommodations to promotion and tenure influence career trajectories for faculty?**
- **Will degree requirements change for majors?**
 - New skill requirements based on employer needs?
 - More flexibility in completion requirements (substitutions, duration of program)

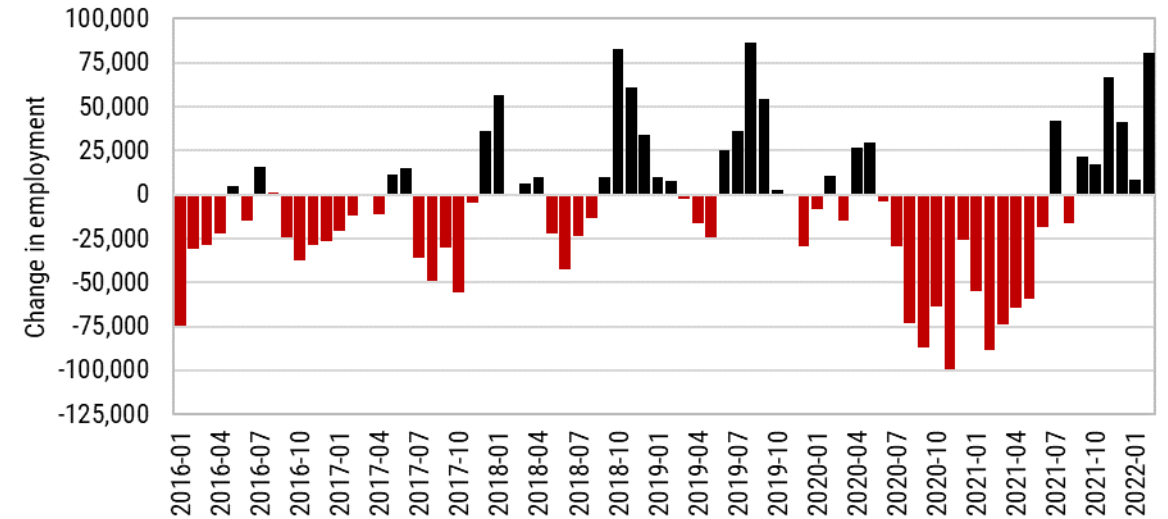
Employment Trends

Total geoscience employment by month



Credit: AGI; data derived from the U.S. Census Bureau, Current Population Survey

Year-over-year change in total geoscience employment



Credit: AGI; data derived from the U.S. Census Bureau, Current Population Survey

Steady decline from Aug 2019 - Feb 2021

Pandemic shocks and oil & gas sector contraction



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Employment resiliency

Professional services shows the most resiliency

Education services

Campus closures

Layoffs

Declining enrollments

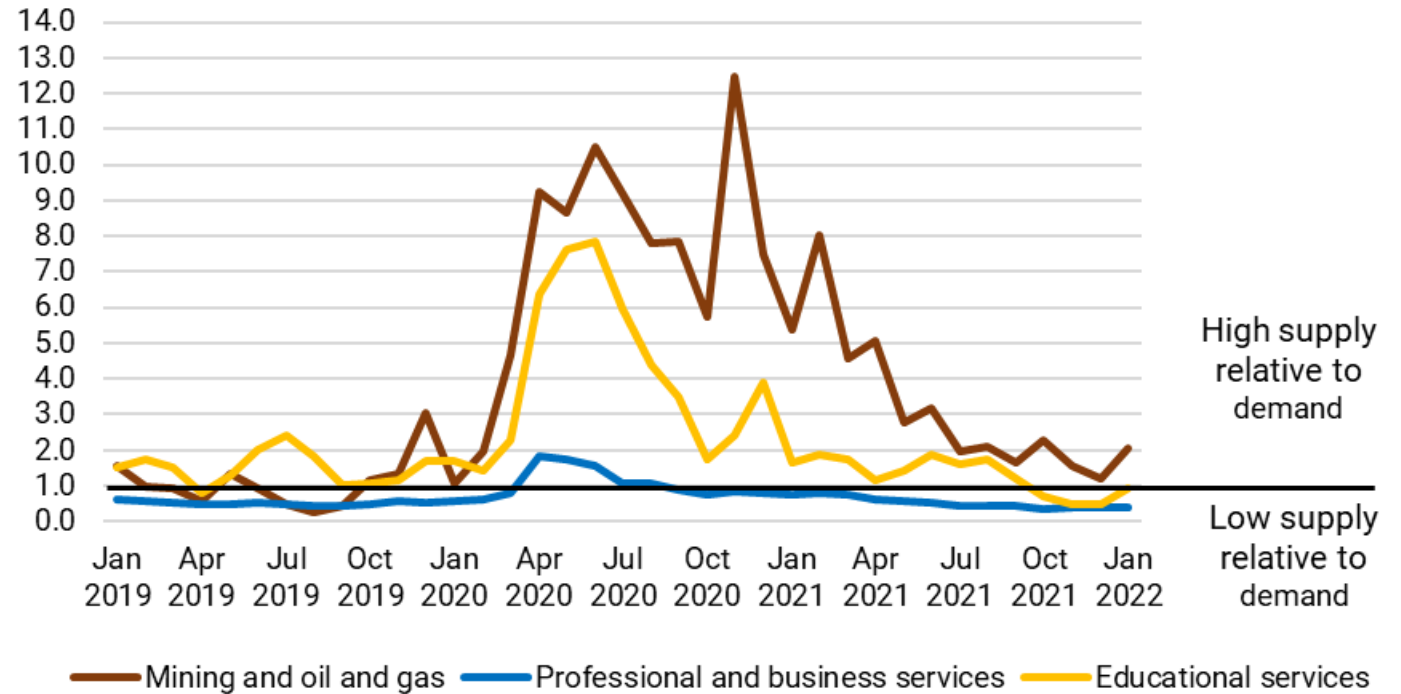
Mining & oil and gas

Softening of market in 2019

Exodus of workers

Reduced demand & travel

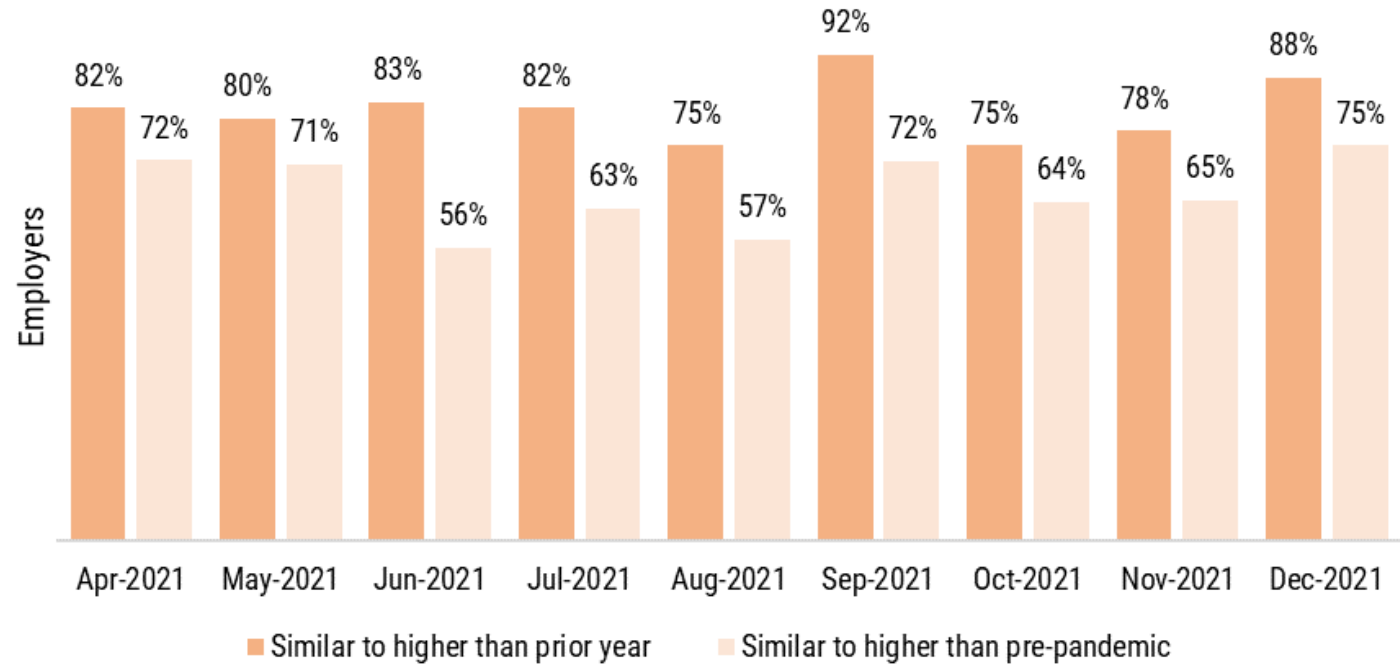
Labor supply & demand:
ratio of experienced unemployed to job openings



Employer financial performance

Financial outlook improved markedly with the release of vaccine programs and economic reopening during 2021.

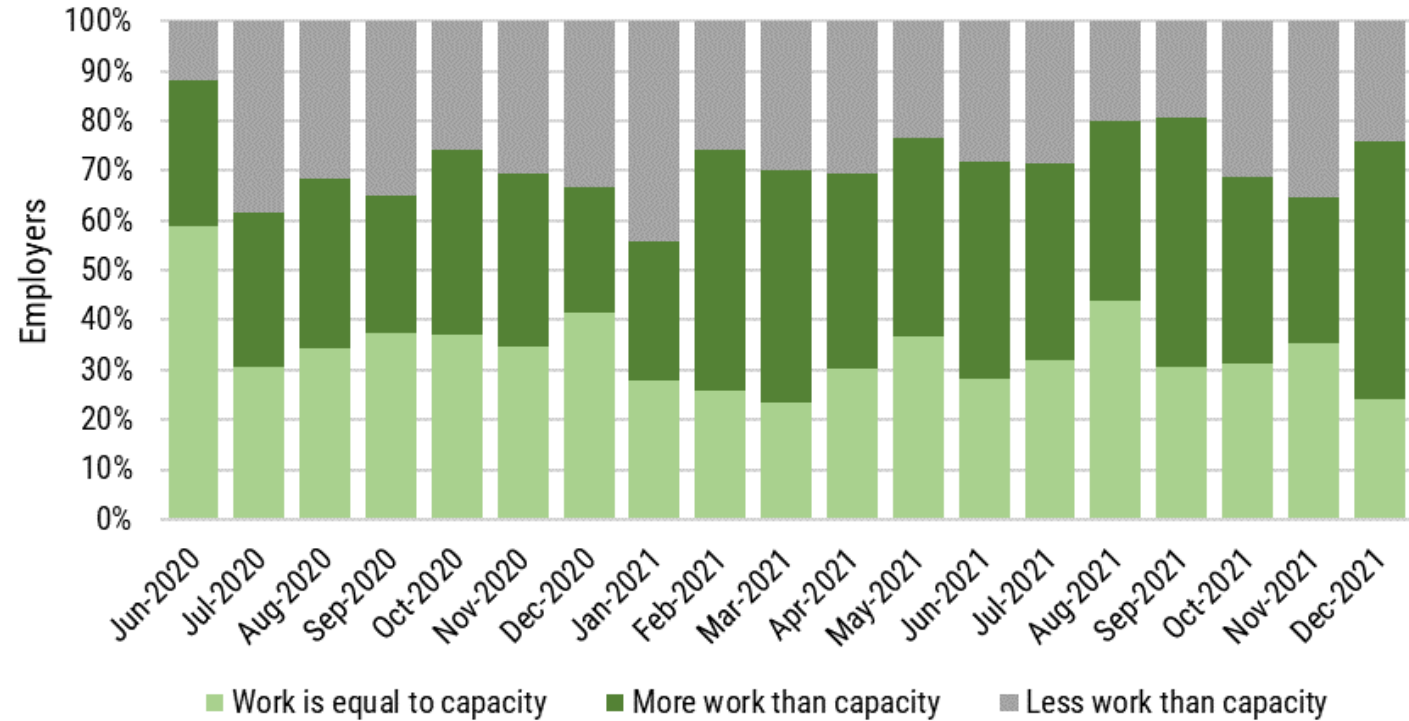
Expectations for financial performance: current calendar year relative to prior year and pre-pandemic



Employer productivity

Most employers continue to report full or excess workloads relative to staffing.

Level of work relative to capacity

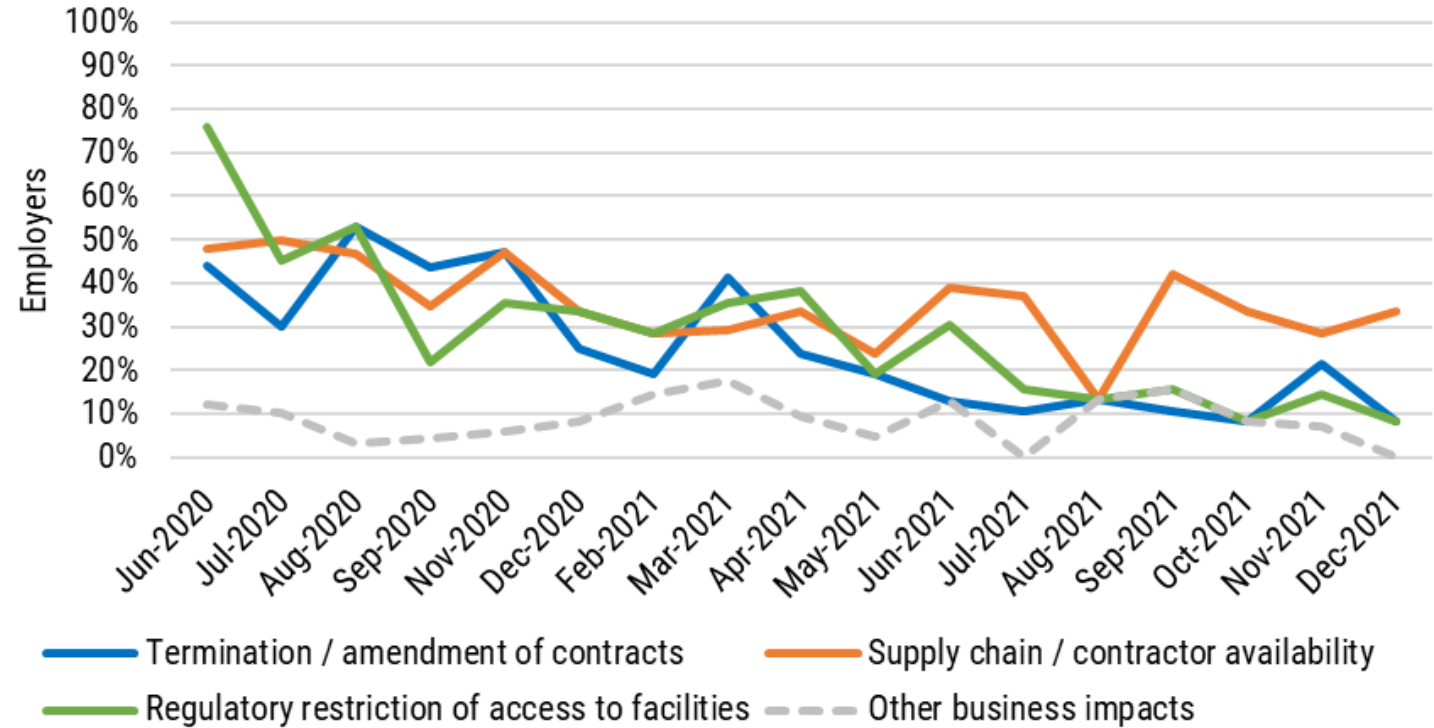


Operational impacts

While impacts are lessening overall, supply chain disruptions continue for ~ 1/3 of employers.

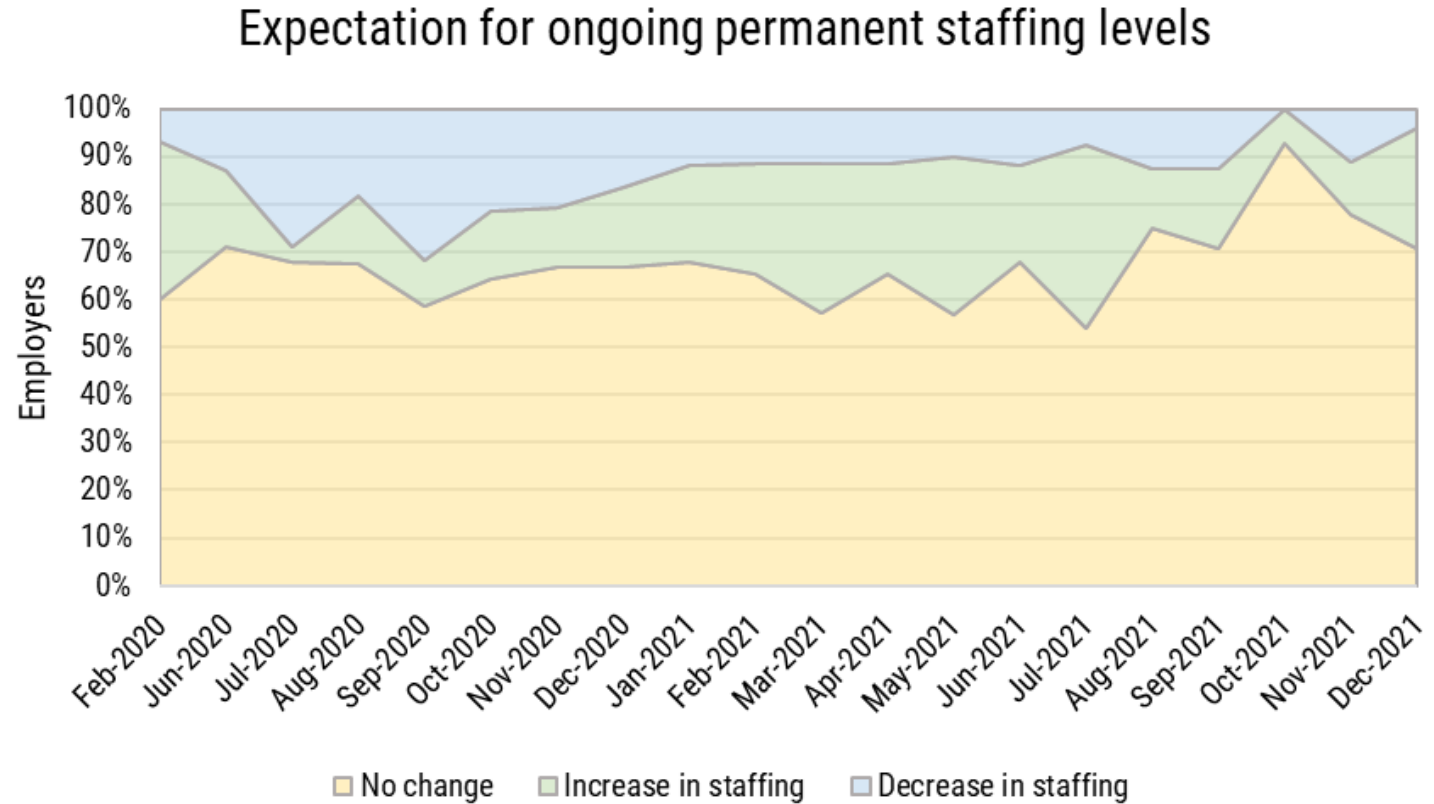
Supply shortages also impacting employers. 2020 – PPE; 2021 – IT supplies.

COVID-19 impacts to business operations



Staffing expectations

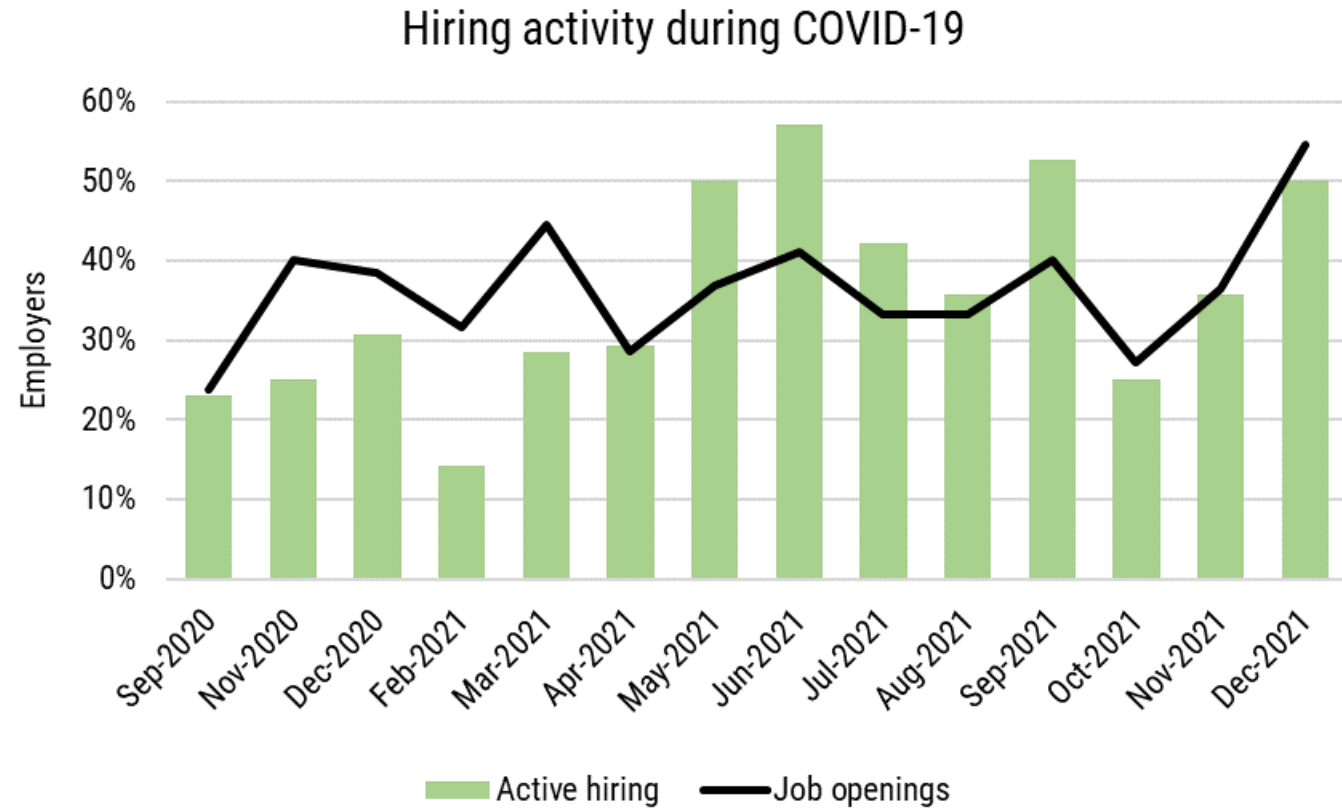
Impacts from Delta variant in staffing expectations in late 2021, but expectations improve again before Omicron wave begins.



Hiring and Job Openings

Hiring picked up in mid-2021 and then again in late 2021.

Job openings remained relatively steady, with an increase in late 2021.



Challenges finding and hiring talent

Increases in the percentage of employers reporting no challenges with finding and hiring talent.

Recruitment continues to be an issue for employers.

Onboarding new staff, especially into remote working environments, remains a challenge.

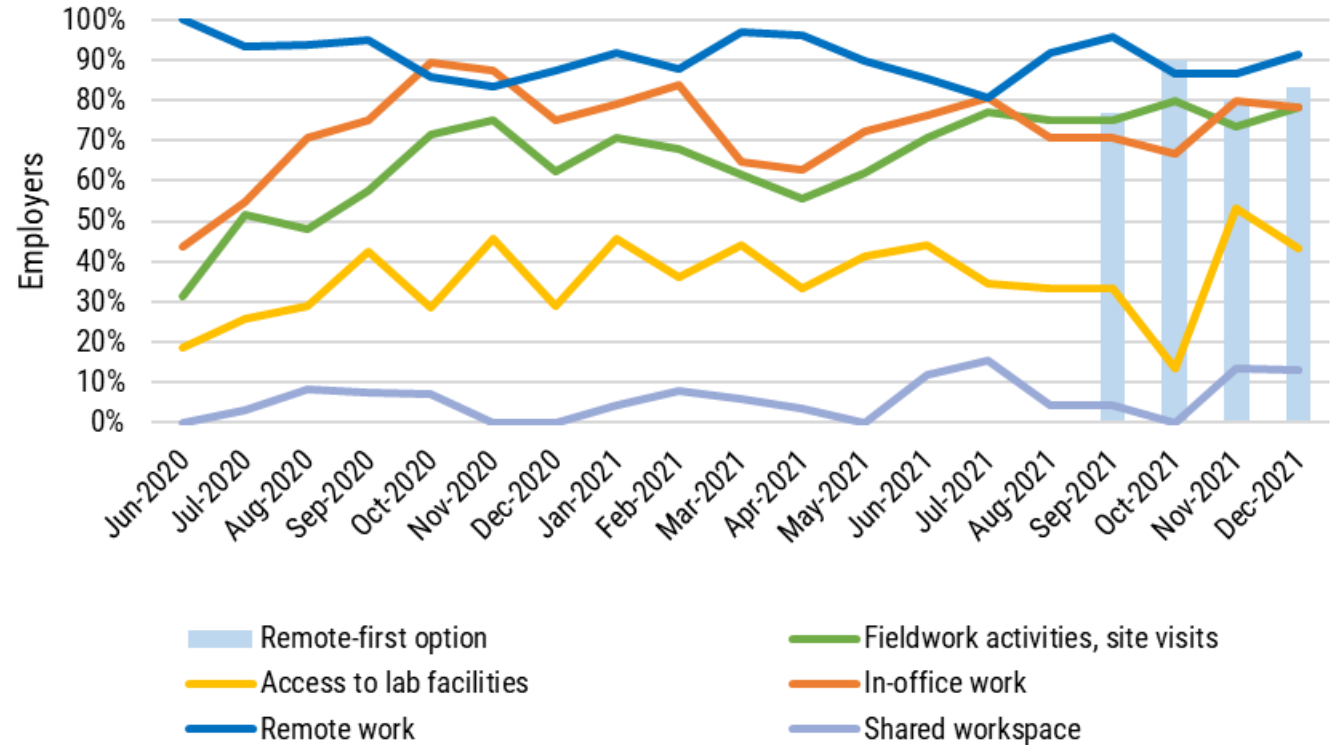


Workplace policies

While in-office work increased thru 2020, remote work options declined only slightly.

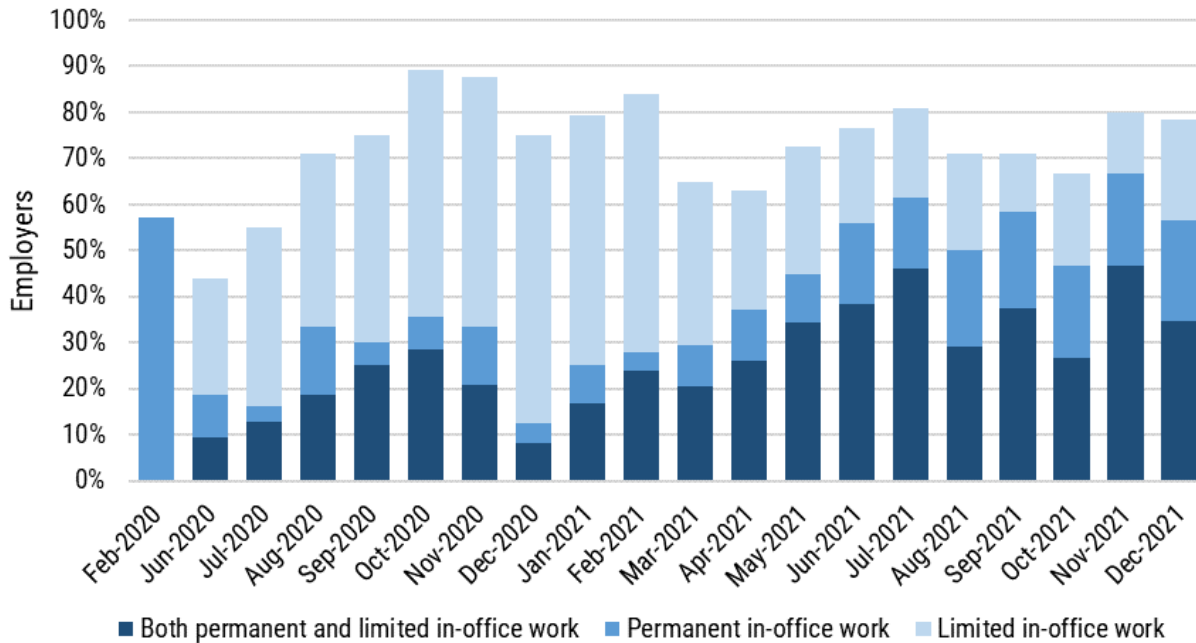
The small percentage of employers offering lab access is reflective of the limited number of companies with lab facilities.

Workplace policies available to employees

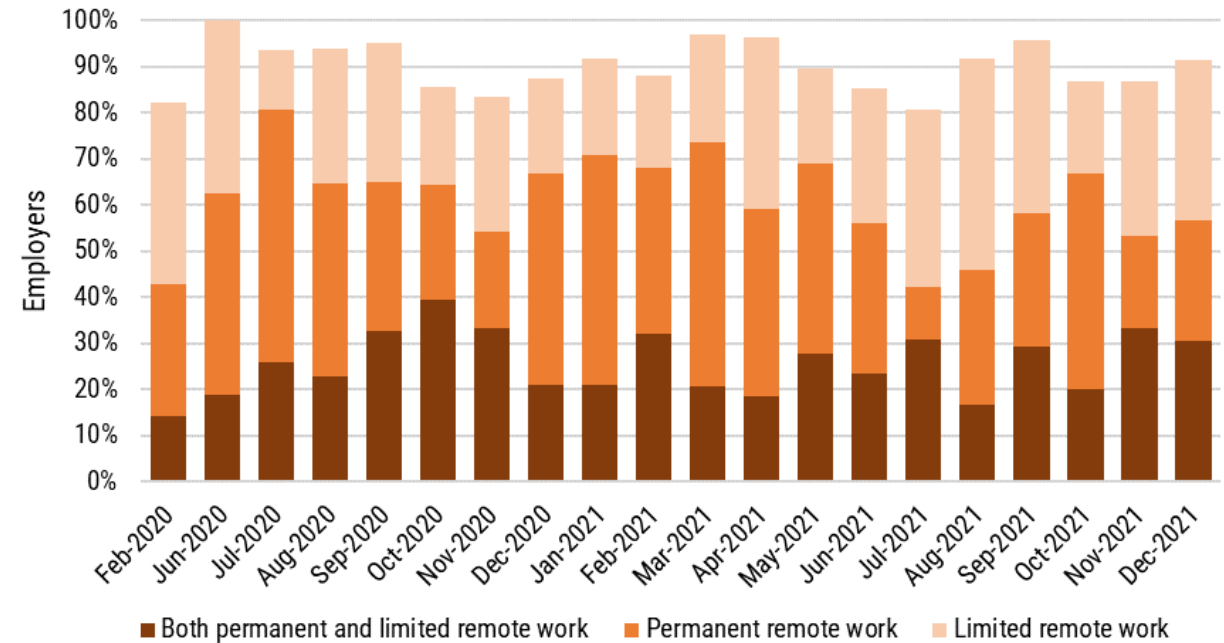


Changes in work policies

In-office work policies available to employees



Remote work policies available to employees

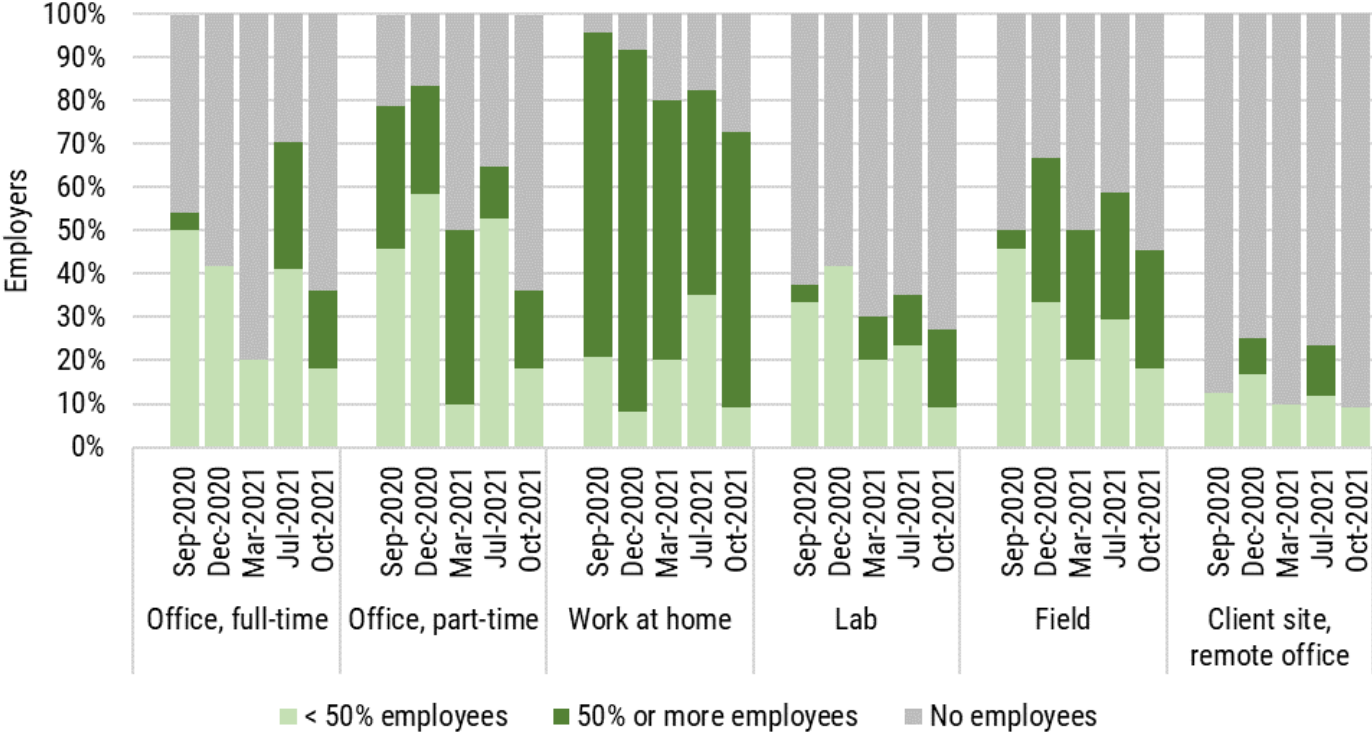


Employers have increased work option flexibility, especially for in-office work.

Work location

Employee distribution across work environments has diversified during the pandemic and has adjusted in response to the pandemic situation.

Employee distribution by workplace environment

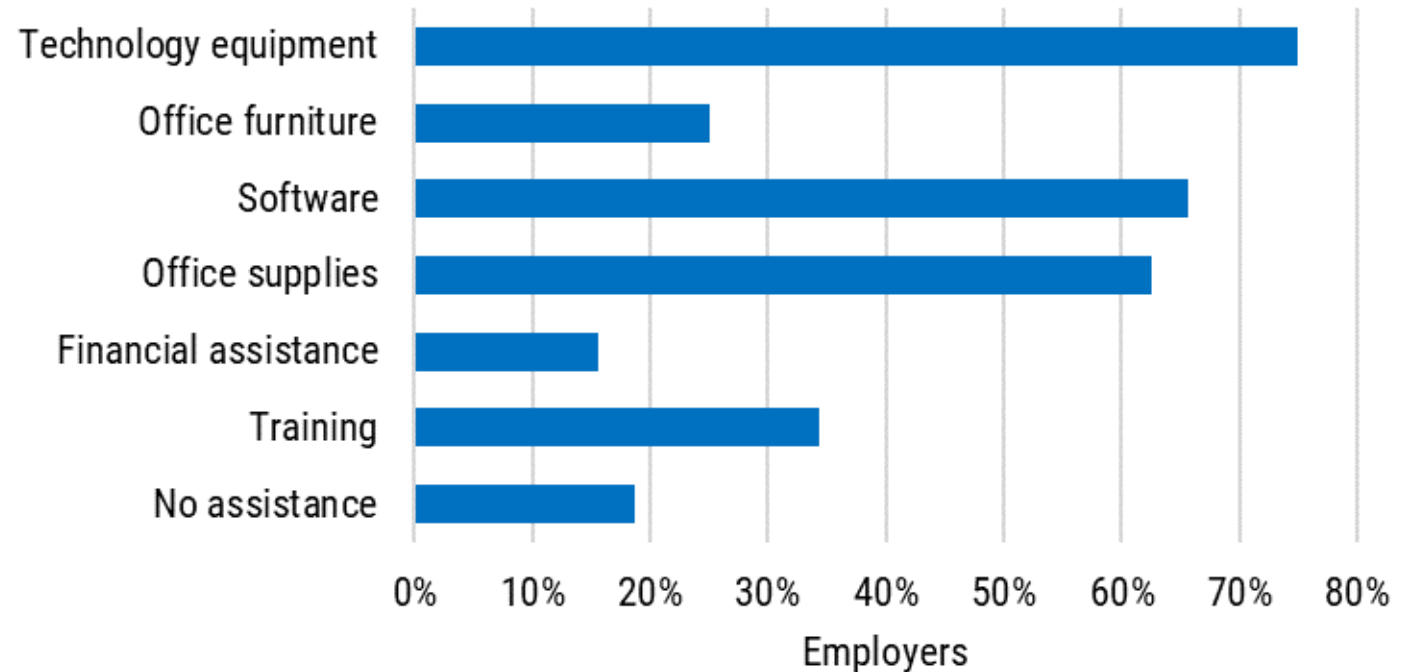


Employer support for remote work

Most employers provided equipment for employees as well as software and office supplies.

Over half of employers have reduced their active office space usage due to remote work.

Assistance provided for work-at-home employees

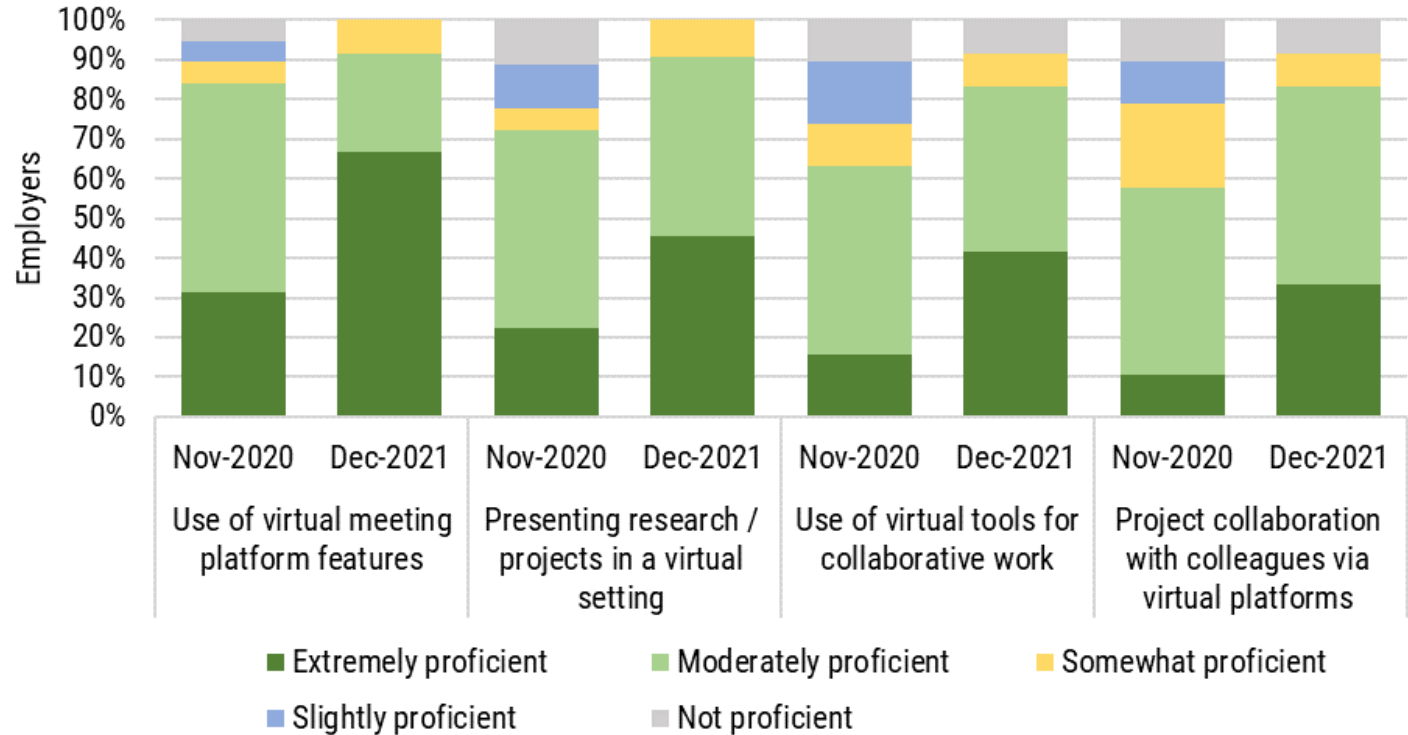


Proficiency with virtual skills

Increased proficiency across all categories.

Most improvement in project collaboration.

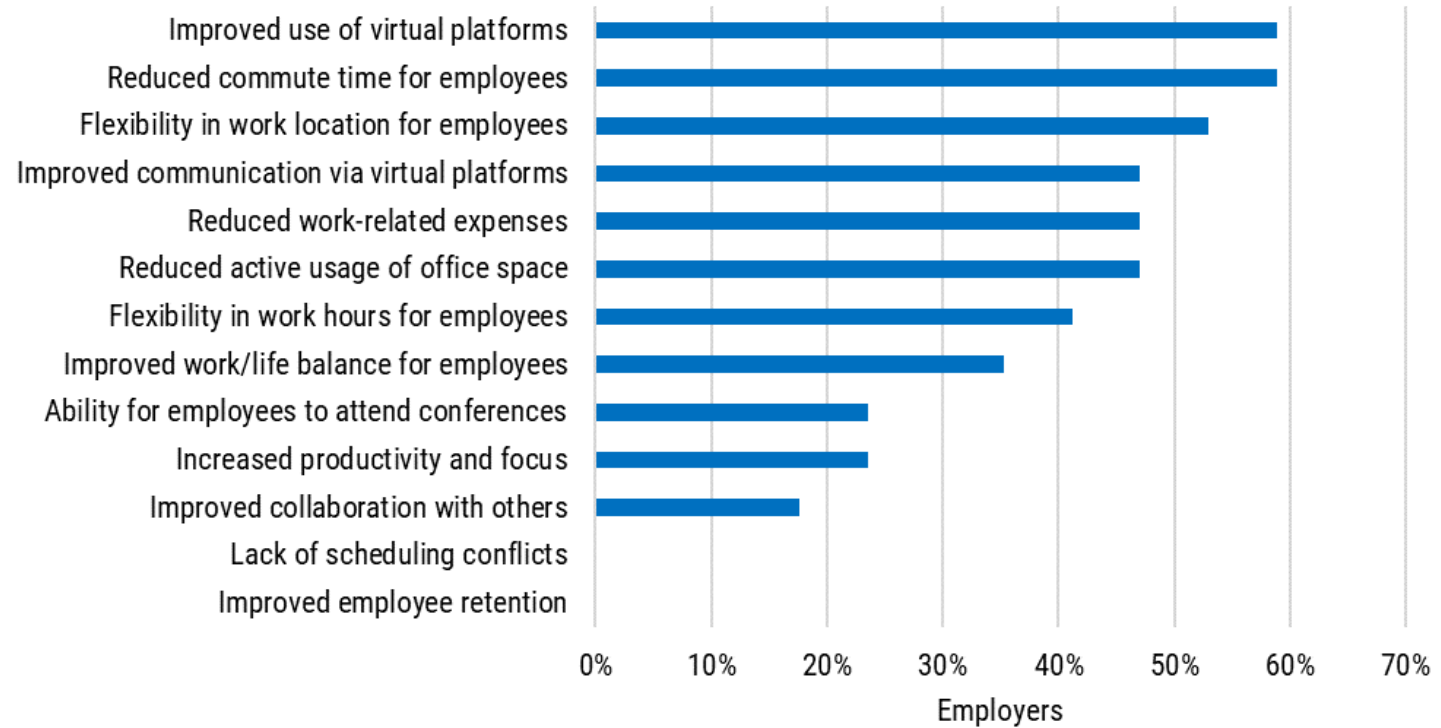
Employee proficiency with selected virtual skills



Benefits to remote work

Top benefits include the improved use of virtual technologies, and flexibility for employees.

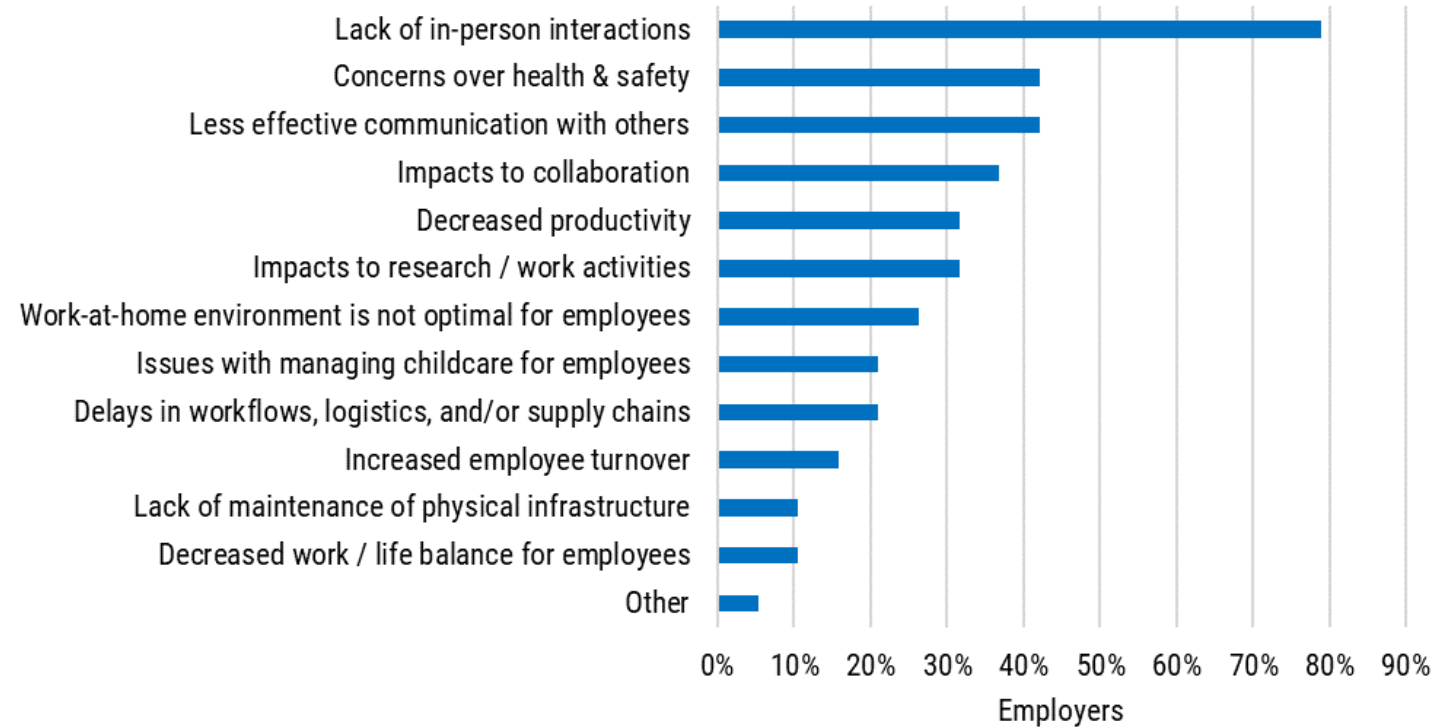
Benefits in how work and research has been conducted during the pandemic



Challenges to remote work

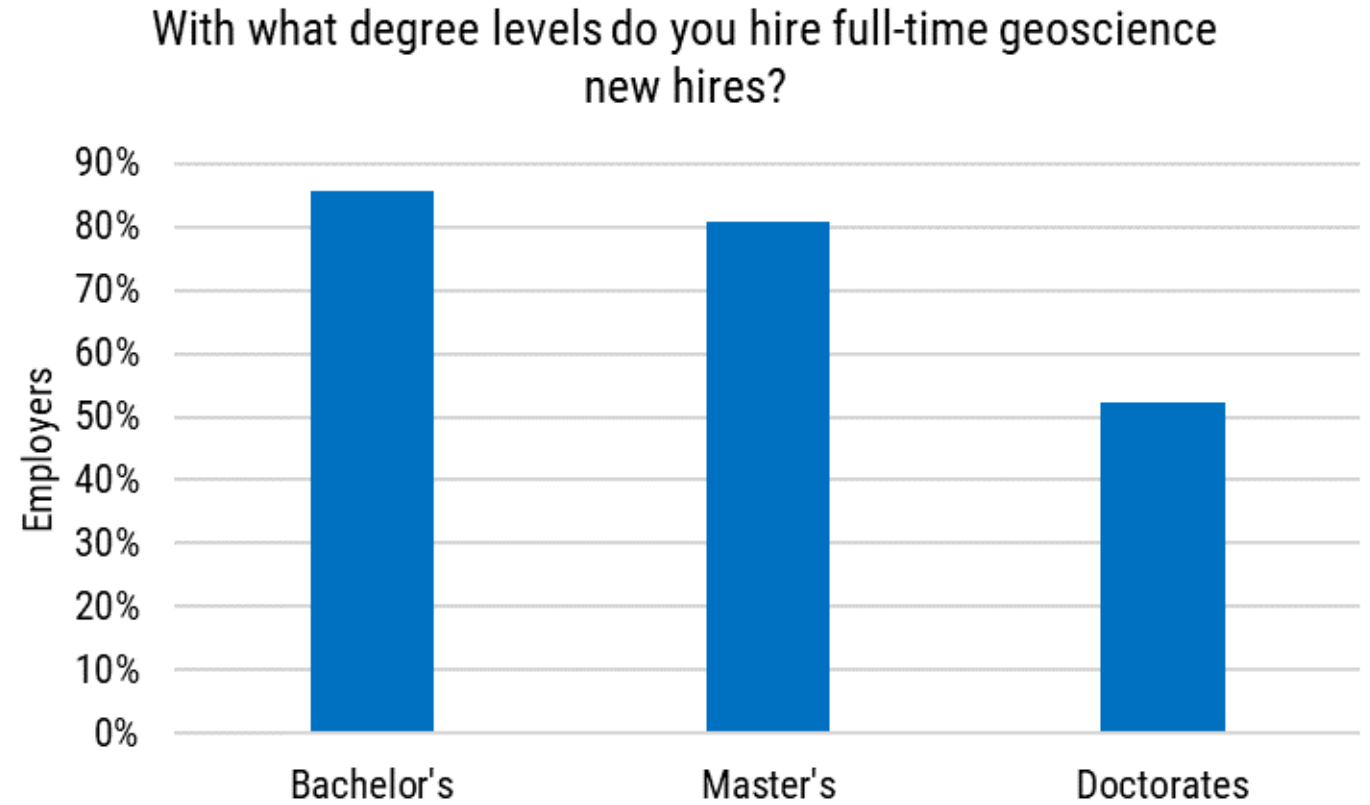
Biggest challenge remains the lack of in-person interactions which fosters relationships, community, and new idea generation.

Drawbacks to how work and research has been conducted during the pandemic



Employer hiring

Employers mostly hire at the Bachelor's and Master's levels.



New hire required / preferred skillsets

Top required skills:

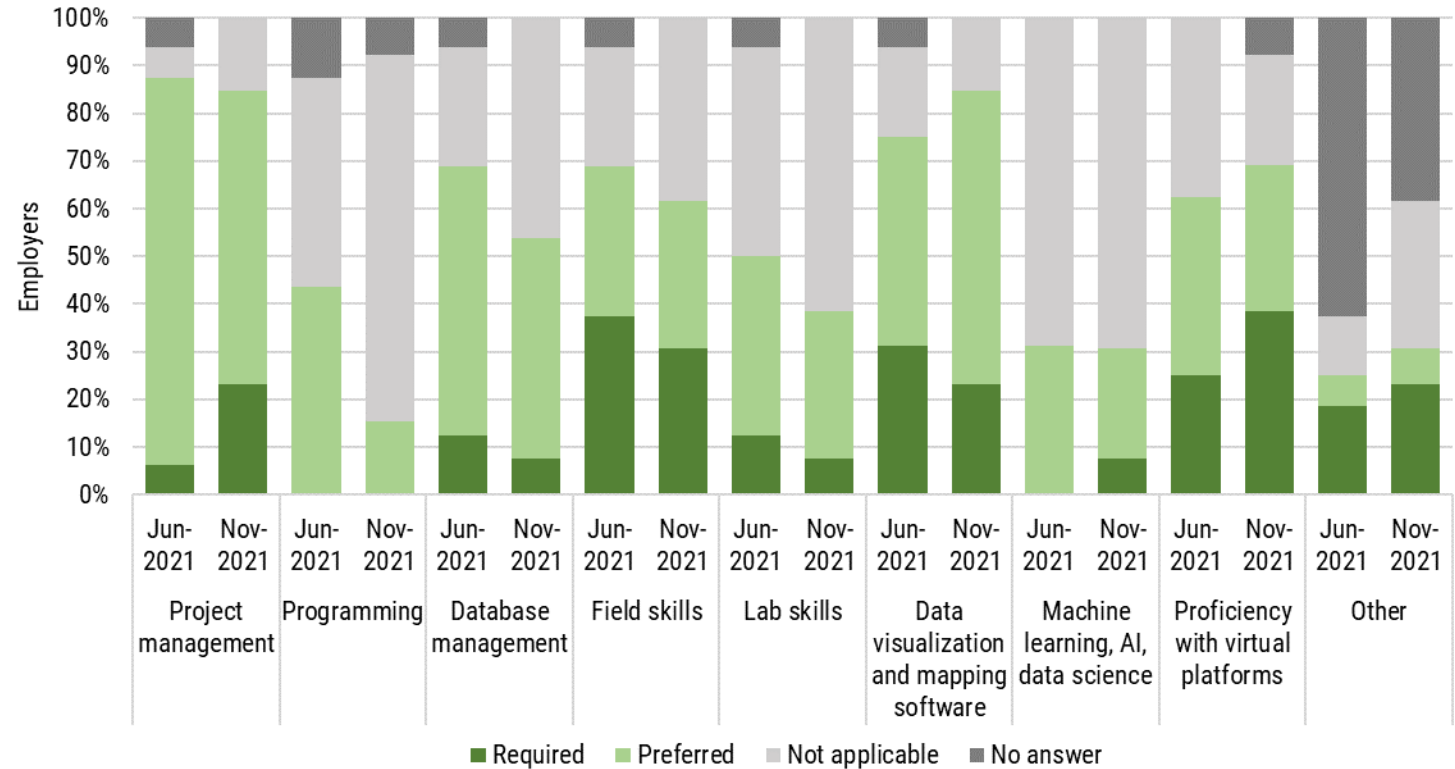
field skills

proficiency with virtual platforms

Proficiency with virtual platforms is becoming increasingly important.

~20% of employers have changed what they are looking for in new hires, with most looking for candidates that can work with minimal to no supervision.

Employer preference for skillsets in new hires



Ongoing questions

- **Will remote work and remote-first policies become permanent?**
 - Will remote work enable a more geographically distributed workforce?
 - Will employers continue financial and logistical support for remote work?
- **Will employers reduce their operational footprint?**
 - What will be the impacts to labs and advanced computing capabilities?
- **Will preferred / required skills for new hires be different than pre-pandemic?**
- **How will employers address skills / knowledge gaps for new hires that were students during the pandemic?**

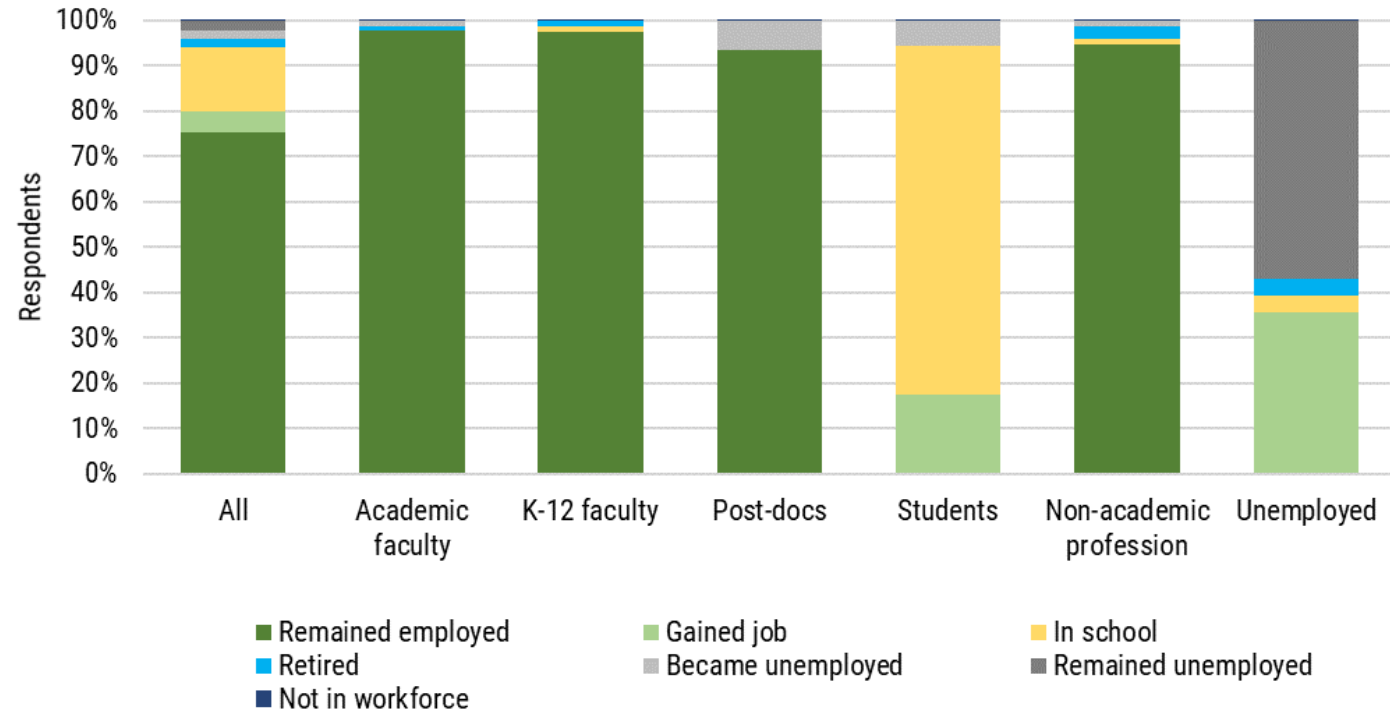
Study participant employment

Over 90% of participants who began study employed, remained employed.

43% of participants who started study as unemployed, found work, went back to school, or retired.

Those who remained unemployed comprise 2% of total participants.

Employment status changes Feb 2020 - Jan 2022

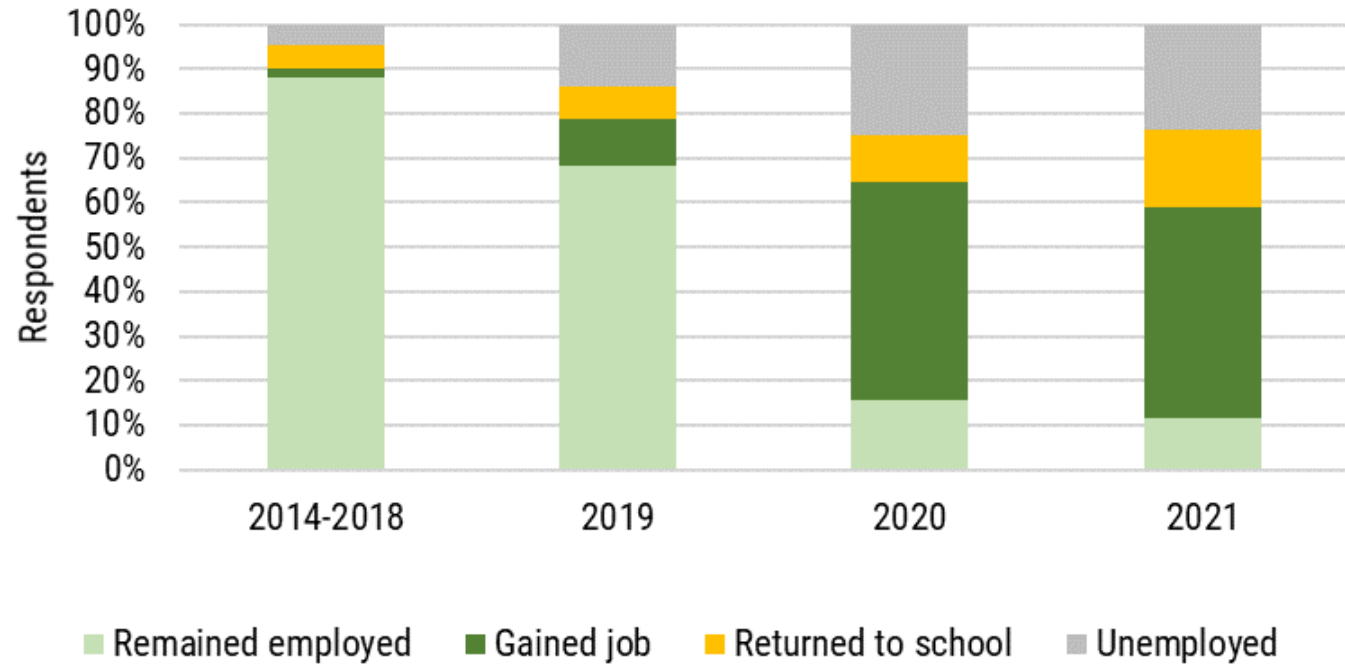


Recent Graduates

Over half of recent geoscience graduates are employed.

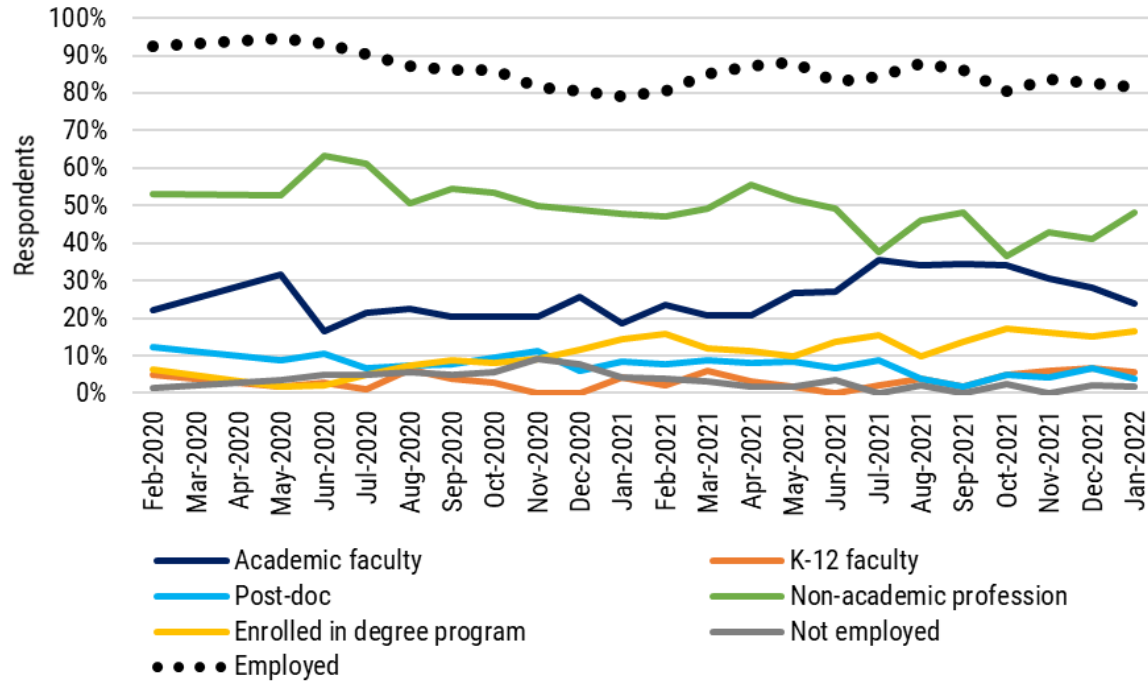
Highest unemployment is among those who graduated during the pandemic.

Status of recent geoscience graduates by graduation cohort, Feb 2020 - Jan 2022

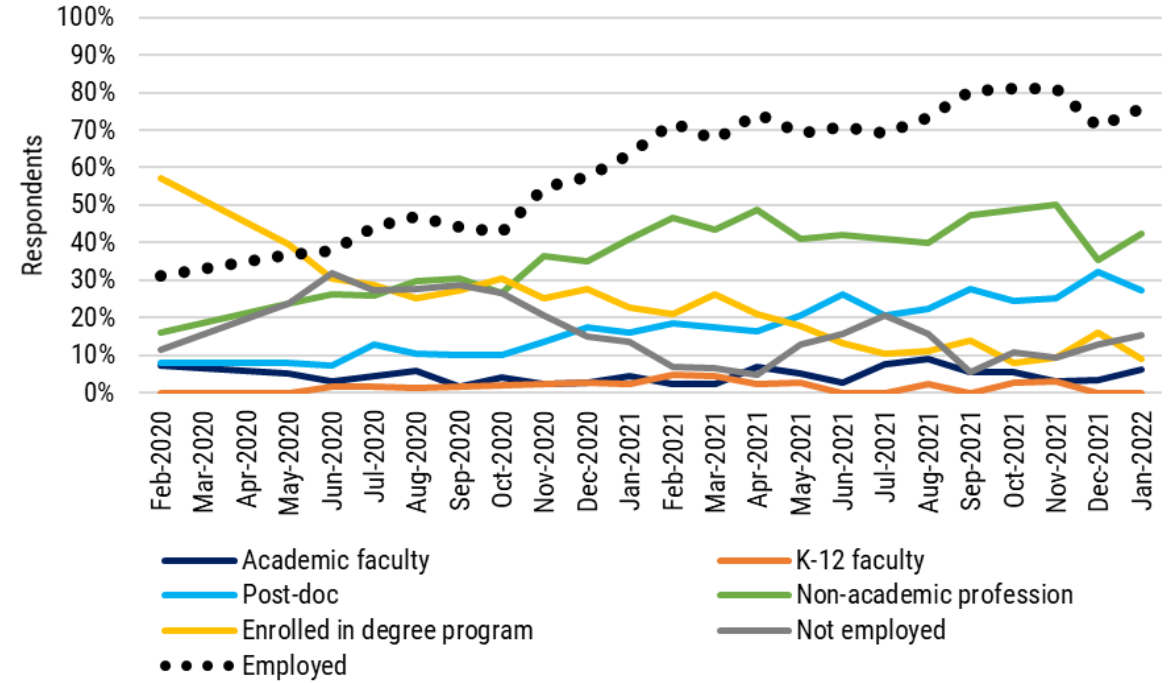


Recent Graduates

Employment status of 2014-2018 geoscience graduates,
Feb 2020 - Jan 2022



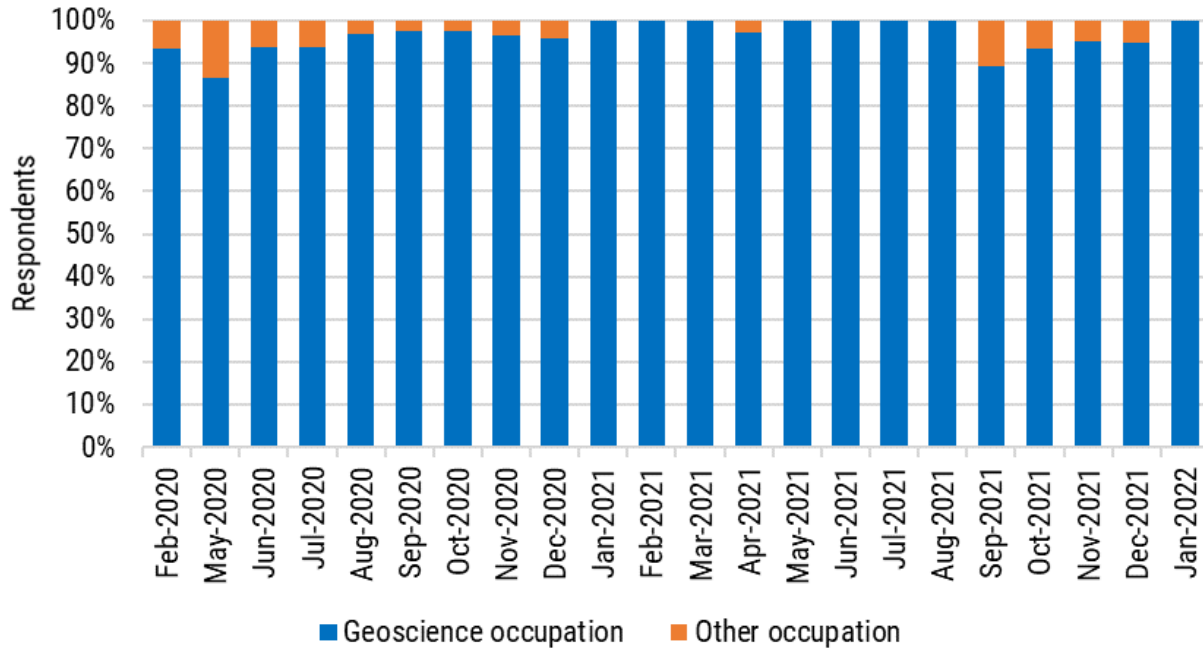
Employment status of 2019-2021 geoscience graduates,
Feb 2020 - Jan 2022



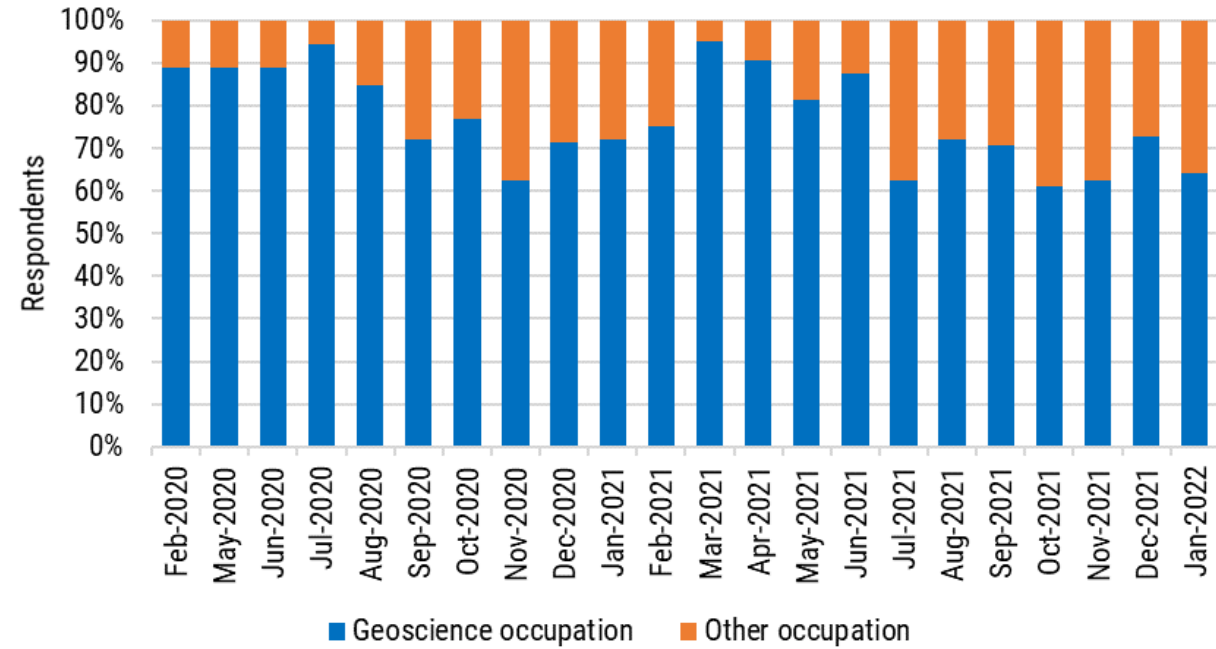
Slight decrease in employment of 2014-2018 graduates due to return to school.
General steady increase in employment of 2019-2021 graduates.

Recent Graduates

Occupations of 2014-2018 geoscience graduates



Occupations of 2019-2021 geoscience graduates

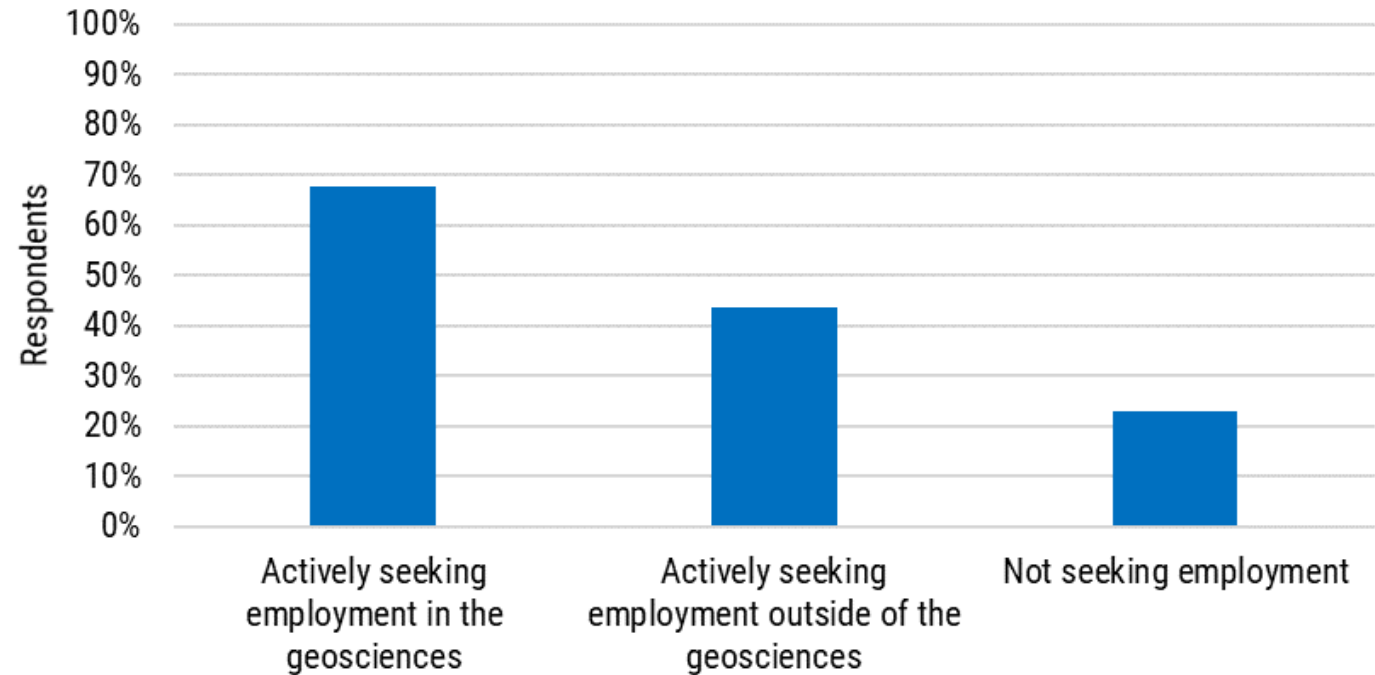


Lower percentage of more recent graduates working in non-geoscience positions. Possibly reflects taking jobs until they find a geoscience job.

Recent Graduates

~1/3 of unemployed recent graduates are seeking work both in the geosciences and in other professions.

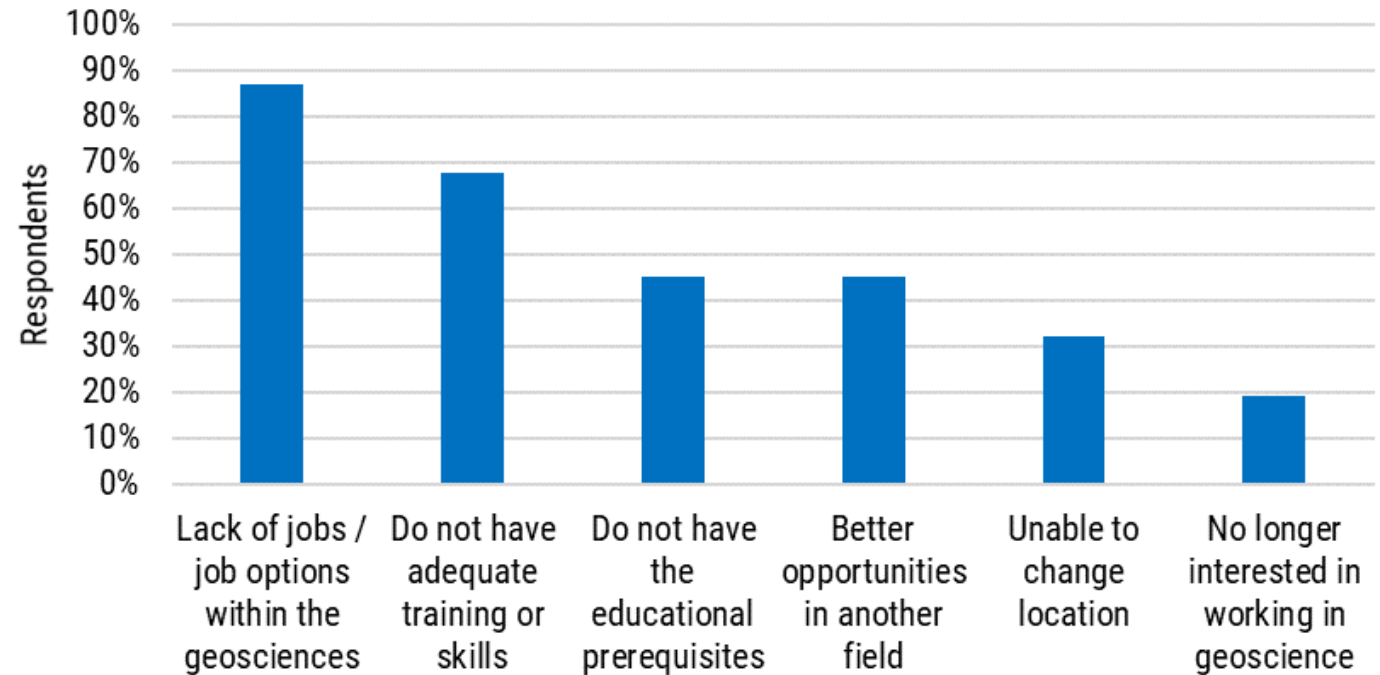
Job seeking activity of unemployed recent geoscience graduates



Recent Graduates

Top reasons for seeking work outside of the geosciences includes lack of geoscience job options, and not having adequate skills or education.

Reasons for seeking employment outside of the geosciences

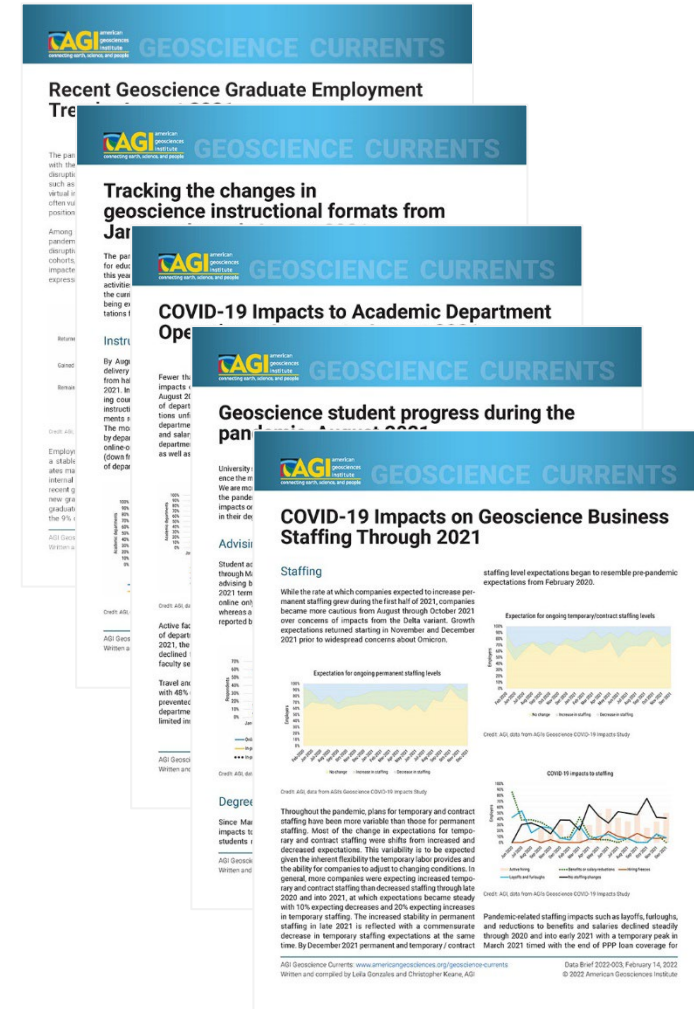


Ongoing questions

- Will pandemic impacts to academic studies impact the types of jobs new graduates pursue?
- Will remote work make jobs more available to new graduates?
- Will more pandemic graduates move into geoscience occupations over the coming year?

Ongoing reporting

- To date – published 57 data briefs through AGI's Geoscience Currents
www.americangeosciences.org/geoscience-currents
- Presentations to AGU/AGI Heads & Chairs community
- GSA 2021 Annual meeting presentation



Thank you!

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