Identifying Alignment and Gaps in Skills Development for Students and New Graduates

Insights from the Geoscience COVID-19 Impacts Study

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Roadmap

- How important and proficient are cohorts with selected skills?
- How are skills being integrated into the curriculum?
- What are the skills employers are looking for in new hires?
- Have preferred / required skills changed since pre-pandemic times?
- Are there skills / knowledge gaps in pandemic-era graduates?
- What are employers, departments, recent grads doing to address these gaps?
Graphic design
A rising skill for all groups
Data visualization / mapping software
The top recognized skill, students & employers most proficient

importance of data visualization skills to the geoscience profession
Percent of responses

proficiency with data visualization skills
Percent of responses
Data science / ML / AI
A fast rising skill with emerging proficiency in the community

- Importance of data science and ML/Al skills to the geoscience profession
  - Percent of responses
  - Not important
  - Decreasing importance
  - Continuing importance
  - Increasing importance

- Proficiency with data science and ML/Al skills
  - Percent of responses
  - Not applicable
  - Expert (recognized authority)
  - Advanced (applied theory)
  - Intermediate (practical application)
  - Novice (limited experience)
  - Basic (fundamental awareness)
Programming
A rising skill for faculty and students, rising proficiency in the workplace
Database management
Universal demand, strong demands from employers
Business skills
A recognized skill, with experience comes proficiency
Business skills: not highly valued by depts, but increasingly offered outside of departments
Data science: new skill, increasingly being incorporated into the curriculum
Data visualization: rated top skill by all cohorts, integrated into all programs
Database skills: important, but only integrated into about half of programs
Graphic design: becoming more important, and increasingly being integrated into undergrad programs
Programming: increasing importance among academics & students, decline in inclusion in undergrad curriculum
Skills / knowledge gaps noted by departments

With the exception of Winter 2022, over half of departments reported no graduating students missing required coursework.

Of those departments reporting graduating students missing coursework, the majority mentioned that graduating students failed to complete field courses or field components of courses.

Assistance for graduating students:
Course substitutions, virtual instruction alternatives, waivers for courses / requirements, additional or independent studies to fulfill requirements

Percentage of graduating geoscience majors unable to take required coursework

- Spring 2021
- Winter 2022
- Spring 2022

More than 50% | 25% to 50% | 10% to 25% | Less than 10% | None
Skills / knowledge gaps noted by departments

“One of the biggest things I've been beating my head against is not a geoscience skill per se. It's a writing skill. My students won't cite their sources to save their lives…” – geoscience faculty

“The reading, writing, arithmetic, all the discipline skills, the book skills were all there, but putting those to good use and the things that they don't teach you in college that you need to know when you get in the real world, we're missing.” – department head

“They have extraordinary poor social skills right now. And I think that can be seen at all levels of the institution. And I'm not just talking about students. I'm talking about staff and coworkers. It's everybody, right? We need to learn how to talk again to others … especially in large groups, because when you're in large groups, you're working off of other people's facial cues of when to stop and went to go. And when cameras are off, you don't have those social cues to work with.” – geoscience faculty
Skills / knowledge gaps noted by graduates

Regarding learning Python:
“I do wonder if it would have been nice to have some, maybe in-person workshop type sessions that maybe would have happened, rather than kind of the trial by fire, it would have been more advantageous to kind of sit down with someone in a conference room, for an hour or two and learn the process, kind of first-hand learn by doing rather than learn by seeing over Zoom with all these other distractions going on.” – recent graduate

“I got to play with my data more so, and I since I wasn’t working on other things, I got to give myself some skills that I didn't have before. So I played more with coding and stuff like this.” – recent graduate
Filling skills / knowledge gaps: Self-taught instruction and on-the-job training (OJT)

How are you acquiring these skills/knowledge?
Percentage of pandemic-era graduates

Did your employer provide skills development training during your new hire onboarding?
Percentage of pandemic-era graduates
What degree levels are employers hiring?

Employers continue to primarily hire at the Bachelor’s and Master’s degree level.

During Summer 2021, just over half of employers reported hiring at the doctorate level, with this percentage declining in Fall 2021 and rebounding after.
What skills are employers looking for?

Skills employers are looking for in geoscience new hires
Percent of employers

Skills employers are looking for in geoscience new hires
Percent of employers

Field skills
Lab skills
Project management
Virtual platforms

Data science, ML/AI
Data visualization
Database management
Programming

Not applicable
Preferred
Required

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Change in what employers are looking for?

Has what you are looking for in new hires changed?
Percentage of employers

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Are the skillsets for new hires different than pre-pandemic?
Percentage of employers

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Are there skills / knowledge gaps?

“It is essential for those coming into the hydrogeology field to be able to communicate well and have good writing skills on top of the basic foundational geology skills they get from a college program.” – geoscience manager

“I got to play with my data more so, and I since I wasn’t working on other things, I got to give myself some skills that I didn't have before. So I played more with coding and stuff like this.” – recent graduate
What are employers doing to address gaps?

- Augment internal / on-site training
- Increased opportunities for social interaction outside of work
- Move to in-work meetings
- Enhancing mentoring / tutoring between new and senior staff
- Longer on-boarding
- Setting up new training both technical and client-relationship focused
- Virtual training using pre-recorded courses and personal training by experienced staff

“We were lucky in that we had some what I'd call old school senior folks. And so we paired up new hires with mentors. And we gave them an opportunity to use a mentor protege program to try and short circuit that and get as much as they could. It's not perfect but getting 73% of that through a mentor is better than saying, hey, you're gonna have to wait two years until we have the opportunity again.” – department head
Alignments and gaps

- Alignment in core geoscience knowledge and skills
- Gaps in writing, communication, presentation, interpersonal skills
- Students want more skills development in programming-related areas
- Addressing the gaps
  - Departments: More in-person instruction with emphasis on field work, teamwork
  - Employers: Longer on-boarding, more mentoring
  - Graduates: Self-taught instruction to fill gaps
Thank you!

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