

What Do We Know About The STEM Workforce Today and in The Future? Trends in STEM Skills, Occupations, and Degrees

Matt Sigelman President, The Burning Glass Institute msigelman@burningglassinstitute.org May 16, 2023

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Talent Shortage or Skills Shortage?

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37% of the skills of the average US job have been replaced over the past five years. What does it take to keep up?

Nearly all of the jobs with the highest levels of skill change are in STEM...

The Skill Disruption Index by Occupation

| Occupation | Skill Disruption Index | Occupation |
|---|------------------------------|---------------------------------------|
| Data engineer | 100 | Biomedical engineer |
| Data scientist | 95 | Director of rehabilitation |
| Web developer | 94 | Accounting supervisor |
| Validation engineer | 90 | Sustainability specialist |
| Network engineer/architect | 88 | Medical transcriptionist |
| Business tntelligence architect/ developer | 88 | Business intelligence analyst |
| Database architect | 88 | IT project manager |
| Inductrial docimor | 97 | Sales engineer |
| | 07 | Interior designer |
| Software developer/engineer | 86 | Mechatronics engineer |
| Computer systems engineer/architect | 83 | Chief information officer/director of |
| Advertising/promotions manager | 83 | information technology |
| Computer programmer | 83 | Marketing assistant/associate |
| Robotics engineer | 83 | Quality inspector/technician |
| UI/UX designer/developer | 83 | Web designer |
| Mobile applications developer | 82 | Customer service manager |
| Industrial-organizational psychologist | 82 | Product manager |
| Database administrator | 82 | Test technician |
| Financial quantitative analyst | 82 | Mathematician |
| Data/data mining analyst | 81 | Aerospace engineer |
| Computer scientist | 81 | Technology consultant |
| Webmaster/administrator | 81 | Solar sales representative |
| Data warehousing specialist | 80 | Community health worker |
| Printer/copier/scanner operator | 79 | Fitness/wellness manager |
| Cyber/information security | 79 | Product development engineer |
| engineer/analyst | 1 | Multimedia designer/animator |
| Biostatistician | 79 | Market research analyst |
| Statistician | 79 | Network/systems support specialist |
| Engineering manager | 79 | Matuark instance administrator |
| Marketing specialist | 79 | ivernorito systems administrator |
| Solar engineer | 79 | Ergonomist |
| Technical sales representative | 78 | E-commerce analyst |

...And the pandemic has accelerated the pace of change dramatically

Key Changes in Skills for Production Techs Change in relative demand vs 2019



Skills of mass disruption: **Emerging technologies are** transforming work

| Skill Area | Postings (last 12 mos) | Projected 5- Year Growth |
|-------------------------------|---------------------------|-----------------------------|
| Software Dev Methodologies | 634,660 | 35% |
| Cloud Technologies | 462,963 | 28% |
| Proactive Security | 373,123 | 39% |
| IT Automation | 282,380 | 59% |
| AI & ML | 197,810 | 71% |
| Connected Technologies | 68,313 | 104% |
| NLP | 36,941 | 41% |
| Fintech | 35,667 | 96% |
| Parallel Computing | 11,056 | 17% |
| Quantum Computing | 2,718 | 135% |



Five Emerging Skill Clusters Define the Efficient Frontier of Disruption

Five skills – AI/ML, cloud computing, product mgmt., social media & data analysis – are growing the fastest and spreading the furthest Demand for these skills is surging, with **1 in 8 openings across the market calling for them**, including 1 in 5 in mfg. and 1 in 10 in gov't Those equipped with these capabilities earn more regardless of their level of experience



Note: Share index of "100" set at beginning of 2022 value



Current Strengths *≠* **Future Readiness**

In highly dynamic fields, pipelines must be forward-looking

| SKILL NAME | POSTINGS | FIRMS | GROWTH SINCE 2019 |
|-----------------------------|----------|--------|-------------------|
| MICROSOFT AZURE | 429,265 | 23,718 | 65% |
| SOFTWARE AS A SERVICE | 296,753 | 21,601 | 32% |
| PUBLIC CLOUD | 88,825 | 6,817 | 38% |
| AMAZON S3 | 72,610 | 7,641 | 25% |
| CLOUD INFRASTRUCTURE | 68,913 | 8,536 | 35% |
| PLATFORM AS A SERVICE | 67,759 | 7,113 | 9% |
| INFRASTRUCTURE AS A SERVICE | 56,914 | 6,682 | 4% |

HIGH DEMAND CLOUD SKILLS

These high demand skills form the base of today's Cloud-related occupations

HIGH GROWTH CLOUD SKILLS

| SKILL NAME | POSTINGS | FIRMS | GROWTH SINCE 2019 |
|-----------------------------|----------|-------|-------------------|
| COLOCATION | 23,388 | 727 | 550% |
| AWS SERVERLESS | 5,335 | 898 | 307% |
| AZURE MONITOR | 2,878 | 685 | 277% |
| AMAZON CONNECT | 2,260 | 477 | 223% |
| CLOUD-NATIVE INFRASTRUCTURE | 1,122 | 309 | 216% |
| SNOWFLAKE | 2,785 | 810 | 180% |
| TWILIO | 6,562 | 602 | 173% |

These high growth skills appear in a small share of job ads, but may define the future of Cloudrelated occupations

Source: Burning Glass Institute analysis of Lightcast job postings data.



Emerging Skills Aren't Just Cut and Paste

How emerging technologies disrupt roles more broadly







FREQUENCY IN POSTINGS • FREQUENCY IN PROFILES

- Actuaries do a lot of math and modeling, but Machine Learning can perform these tasks as well.
 Only about 2% of actuary job postings required ML skills.
- Four skills needed by Actuaries without ML skills – finance, financial statements, accounting, and reinsurance – are no longer even sought from those with ML skills.
- In their place are five new skills: ML, R, Python, Visual Basic for Applications, and Risk Analysis.



STEM Talent Demand is Greater Than You Think

Jobs across all fields increasingly demand STEM skills





How CS Has Swallowed Up Engineering

ENGINEERING DEGREES AS A PERCENTAGE OF ALL CONFERRALS



COMPUTER SCIENCE SHARE OF ENGINEERING DEGREE CONFERRALS



- While engineering conferrals have grown over the past 50 years, virtually all this increase can be attributed to Computer Science
- The rate of non-CS engineering degrees conferred has decreased since 1971
- The growth in popularity for computer science has crowded out other disciplines

Source: Burning Glass Institute analysis of Natl Center for Education Statistics data: https://nces.ed.gov/programs/digest/d15/tables/dt15_322.10.asp



- A Harvard study found that the early returns to STEM degrees decline by >50% in the first decade of work
- The rapid pace of tech change combined with limited opportunity for workers to upskill means that STEM workers become obsolete
- Higher ability workers often switch out of STEM and into fields that value experience



Source: Deming, David "STEM Careers & Technological Change", NBER, 2018 using Lightcast data



Artificial Constraints

Degree inflation for STEM roles chokes supply



■2012 ■2021

STEM DEGREE INFLATION

- Contrary to the rest of the market, degree inflation is on the rise in STEM fields, leaving no path up for nondegreed workers.
- The percentage of Computer/ Math occupations requiring a degree has increased 17% over the past decade
- This runs counter to broader market embrace of skills-based hiring, with the percentage of all job postings requiring a degree down 27% (in the same time period



Matt Sigelman msigelman@burningglassinstitute.org https://www.linkedin.com/in/mattsigelman/