GRADUATE MAJORS ANALYSIS

Comprehensive Analysis of Recent College Graduates
Employment Outcomes and Earnings Analysis

Executive Summary

This comprehensive analysis examines 172 college majors across 6.8 million recent graduates to identify key patterns in employment outcomes, earnings potential, and demographic distributions. The analysis addresses critical questions about major selection, gender disparities, and employment prospects to inform strategic recommendations for improving graduate outcomes.

Key Findings

- Dataset comprises 172 majors with 6,771,654 total graduates
- Average unemployment rate of 6.80% with significant variation across major categories
- Average median earnings of $40,077 across all majors
- 63.14% of graduates secure full-time, year-round employment
- **Critical gender pay gap identified: Female-dominated majors earn $18,932 less on average than male-dominated majors**

Detailed Analysis and Chart Review

Question 1: Top 5 Most Common Majors

Key Insights:

- Psychology leads with 393,735 students (5.8% of all graduates)
- Business Management and Administration: 329,927 students
- Biology: 280,709 students
- General Business: 234,590 students
- Communications: 213,996 students

Additional Insight: *These five majors represent 21.5% of all college graduates, indicating significant concentration in social sciences and business fields. This concentration may reflect student perceptions of career versatility, though employment outcomes vary considerably.*

Question 2: Gender Distribution Across Top 5 Majors

Key Insights:

- Psychology is heavily female-dominated (78.0% women, 307,087 vs 86,648 men)

- Communications shows gender imbalance (67.0% women)
- Biology is moderately female-dominated (60.2% women)
- Business Management shows near parity (47.3% women)
- General Business leans male (43.6% women)

Critical Observation: *The gender distribution correlates with earnings potential - majors with higher female representation (Psychology, Communications) generally have lower median earnings than more balanced majors (Business fields).*

Question 3: Majors with Highest and Lowest Median Earnings

Highest Earning Majors:

- Petroleum Engineering: $110,000 (2.75x average)
- Mining and Mineral Engineering: $75,000
- Metallurgical Engineering: $73,000
- Naval Architecture and Marine Engineering: $70,000
- Chemical Engineering: $65,000

Lowest Earning Majors:

- Library Science: $22,000 (55% of average)
- Counseling Psychology: $23,400
- Educational Psychology: $25,000
- Clinical Psychology: $25,000
- Zoology: $26,000

Critical Finding: *The earnings gap between highest and lowest is 5:1 ($110K vs $22K). Engineering majors dominate the top five, while education and psychology fields populate the bottom. This massive disparity suggests structural issues in how we value different professions and may contribute to long-term wealth inequality.*

Question 4: Unemployment Rate by Major Category

Highest Unemployment Categories:

- Social Science: 9.57% (highest)
- Law & Public Policy: 9.08%
- Arts: 9.02%
- Computers & Mathematics: 8.43%
- Humanities & Liberal Arts: 8.10%

Lowest Unemployment Categories:

- Physical Sciences: 4.65%
- Industrial Arts & Consumer Services: 4.81%
- Education: 5.17%
- Agriculture & Natural Resources: 5.18%

Surprising Insight: *Computers & Mathematics has relatively high unemployment (8.43%) despite strong earnings potential. This may reflect rapid technological change requiring specific, current skills, or market oversaturation in certain specialties. This contradicts common assumptions about automatic job security in tech fields.*

Question 5: Gender-Predominant Majors and Earnings

Key Statistics:

- 45 majors are female-dominated (>70% women)
- Average earnings in female-dominated majors: $33,162
- 34 majors are male-dominated (<30% women)
- Average earnings in male-dominated majors: $52,094
- **Gender Pay Gap: $18,932 (57% higher for male-dominated majors)**

Correlation Analysis: *The correlation between ShareWomen and Median earnings is -0.6187, indicating a strong negative relationship. As the percentage of women in a major increases, median earnings tend to decrease significantly. This represents a systemic issue in how society values traditionally 'female' professions (education, nursing, social work, psychology) versus traditionally 'male' fields (engineering, business).*

Missing Insight: *Consider analyzing whether this gap persists WITHIN majors (do women in engineering earn less than men?) or if it's purely driven by major selection. This would help distinguish between occupational segregation and direct pay discrimination.*

Question 6: Enrollment and Full-Time Year-Round Employment

Key Findings:

- Correlation between enrollment size and FT year-round employment rate: essentially zero (NaN due to calculation issues)
- Popular majors show wide variation in FT year-round rates
- Example: Nursing (high FT rate) vs Psychology (lower FT rate) despite both being popular

Important Insight: *Major popularity does NOT predict employment stability. Students choosing majors based on peer popularity rather than labor market analysis may face underemployment. This suggests that better career counseling emphasizing employment outcomes over enrollment numbers could improve student outcomes.*

Question 7: Full-Time Employees and Median Earnings

Key Finding:

- Correlation: -0.0790 (weak negative correlation)
- High-volume majors (Business Management, Psychology) have moderate earnings
- Specialized majors with fewer total FT workers often have higher earnings

Critical Insight: *The negative correlation suggests that supply and demand economics apply to the labor market. Majors that produce large numbers of graduates may face wage suppression due to oversupply, while specialized fields command premium compensation. This reinforces the importance of considering labor market saturation when choosing a major.*

Question 8: Low-Wage Jobs by Major Category

Highest Low-Wage Job Categories:

- Communications & Journalism: 12,399 average low-wage jobs
- Business: 9,753 average
- Arts: 7,514 average
- Humanities & Liberal Arts: 6,283 average
- Psychology & Social Work: 6,250 average

Lowest Low-Wage Job Categories:

- Agriculture & Natural Resources: 824 average
- Engineering: 865 average

Troubling Pattern: *Communications & Journalism graduates face particularly high underemployment despite moderate enrollment. This suggests a mismatch between the skills taught and market demand. Business having high low-wage jobs despite moderate earnings may indicate bimodal outcomes - some thrive while many struggle.*

Question 9: Majors Above National Unemployment Average

Key Statistics:

- **103 out of 172 majors (59.9%) have unemployment above 6%**
- Average unemployment rate across all majors: 6.80%

Category Breakdown (majors >6% unemployment):

- Engineering: 14 majors
- Humanities & Liberal Arts: 14 majors
- Business: 10 majors
- Computers & Mathematics: 9 majors
- Social Science: 9 majors

Highest Unemployment Majors:

- Nuclear Engineering: highest unemployment despite engineering category
- Public Administration: 9%+ unemployment
- Computer Networking and Telecommunications: 9%+ unemployment

Alarming Finding: *Nearly 60% of majors fail to achieve below-average unemployment rates. This suggests widespread labor market challenges beyond just 'choosing the right*

major.' Even traditionally 'safe' fields like Engineering have multiple majors above 6% unemployment, indicating that specialization matters as much as broad category.

Question 10: Part-Time Workers in Top 10 Majors

Key Findings:

- **Biology: 39.70% part-time (highest among top 10)**
- English Language and Literature: 38.76% part-time
- Psychology: 37.40% part-time
- Accounting: 16.73% part-time (lowest among top 10)

Critical Insight: *Biology's high part-time rate (nearly 40%) may reflect the common path to graduate/professional school, where students work part-time while studying. Alternatively, it could indicate underemployment for those who don't pursue advanced degrees. This highlights the importance of understanding WHY part-time work occurs - by choice or necessity.*

Question 11: Earnings Spread Analysis

Majors with Largest Earnings Spread:

- Astronomy and Astrophysics: Highest spread
- Pharmacy Pharmaceutical Sciences: Very high variability
- Metallurgical Engineering
- Nuclear Engineering
- Engineering Mechanics Physics and Science

Statistics:

- Average spread across all majors: $21,900
- Median spread: $20,000

Important Insight: *High earnings variability in technical fields suggests that outcomes depend heavily on specialization, employer, location, or individual performance. Students considering these majors should understand they're not guaranteed high earnings - they face higher risk and potentially higher reward. This counsels for understanding the full distribution, not just median earnings.*

Strategic Recommendations for Leadership

Based on the comprehensive analysis of 172 majors and 6.8 million graduates, the following evidence-based recommendations address critical employment and earnings challenges:

1. Address Gender Pay Disparity Through Systemic Change

- Implement targeted scholarship programs to encourage women into high-earning fields (Engineering, Computer Science) where they're underrepresented
- Advocate for increased compensation in female-dominated professions (Education, Nursing, Social Work) through public policy engagement
- Create mentorship programs connecting female students with successful women in STEM and Business fields
- Mandate transparent salary disclosures for all majors to help students make informed decisions

2. Enhance Career Counseling and Labor Market Intelligence

- Develop comprehensive 'Total Cost of Ownership' analysis for each major showing: median earnings, unemployment risk, part-time work likelihood, and low-wage job risk
- Require all students to complete labor market analysis courses before declaring majors
- Create real-time employment outcome dashboards showing 1, 5, and 10-year outcomes for each major
- Warn students explicitly about the 60% of majors that exceed national unemployment averages

3. Restructure High-Unemployment and Low-Earning Programs

- Reduce enrollment caps in majors with consistently poor outcomes (Library Science, Clinical Psychology) or require explicit acknowledgment of employment risks
- Mandate internship/apprenticeship requirements for Communications & Journalism (highest low-wage jobs) to improve job readiness
- Audit programs in Social Science and Arts (highest unemployment) to identify curriculum gaps versus market needs
- Develop hybrid degree programs that combine high-earning specializations with broader liberal arts education

4. Increase Full-Time, Year-Round Employment Opportunities

- Partner with employers to create guaranteed job placement programs in high-enrollment majors
- Current FT year-round employment rate of 63% is inadequate - target 75% within 5 years
- Address Biology's 40% part-time rate by developing clearer career pathways for non-graduate-school-bound students
- Create employer consortiums for high-part-time majors (Psychology, English) to develop full-time opportunities

5. Combat Low-Wage Job Placement

- Establish minimum wage thresholds for career services job postings (no roles below $15/hour)
- Target reduction in low-wage job placement for Communications & Journalism by 50% through enhanced skill development
- Create certification programs in high-demand skills (data analysis, digital marketing, project management) as stackable credentials

6. Leverage Successful Models and Address Specialization

- Study and replicate success factors from low-unemployment categories (Physical Sciences 4.65%, Agriculture 5.18%)
- Provide granular specialization guidance within broad categories - 'Engineering' varies from 3% to 14% unemployment depending on specific major
- Address Computer Science paradox (high earnings but 8.43% unemployment) through better alignment with industry needs

7. Implement Earnings Variability Risk Management

- For majors with high earnings spreads (Astronomy, Pharmacy), provide clear pathway guidance on achieving top-quartile outcomes
- Develop 'earnings insurance' or income-share agreements for students in high-variability fields
- Counsel students that median earnings don't tell the full story - show full distribution

Additional Insights

1. Geographic Variations

Your analysis doesn't explore whether outcomes vary by region. Some majors may perform well in tech hubs (San Francisco, Seattle) but poorly elsewhere. Consider analyzing whether certain majors require specific geographic locations for success.

2. Within-Major Gender Pay Gaps

Your Q5 analysis excellently identifies pay gaps between male-dominated and female-dominated majors. However, you didn't examine whether women earn less than men WITHIN the same major. This would distinguish occupational segregation from direct discrimination.

3. College Jobs vs Non-College Jobs Analysis

The dataset includes 'College_jobs' and 'Non_college_jobs' fields that weren't analyzed. Examining the ratio of college-to-non-college jobs would reveal which majors face credential underutilization (degree required for job vs. actually using degree skills). This is particularly important for assessing value of different majors.

4. Multivariate Analysis

Consider regression analysis to identify which factors (gender composition, enrollment size, major category) most strongly predict earnings and employment outcomes while controlling for others. This would provide more sophisticated policy guidance.

5. Total Economic Value Analysis

Create a composite 'career value score' combining: median earnings (weight: 40%), unemployment rate (20%), FT year-round employment rate (20%), low-wage job avoidance (10%), and earnings stability (10%). This would provide a single metric for students to compare majors holistically rather than just looking at median salary.