Information Science Degree Outlook Study

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Question

Our project question was, "How well are Information Science majors/minors finding jobs related to their field?" Additional questions included how well Information Science students and graduates are finding employment or getting accepted into graduate programs in/related to their field of study, what field Information Science graduates are most prominently in, and what was the average salary for majors/minors in this field?

Motivation and Background

The study of Information is not just a collection of data points - it is fundamentally interested in the relationships between information, people, and technology. The CU Department of Information Science defines this field as "the study of the relationships between people, places and technology and how they are intertwined." (University of Colorado Boulder, n.d.). As soon-to-be INFO graduates ourselves, understanding how an Information Science degree will help us find employment is very important to us as individuals. We are also curious about how COVID-19 has changed the job market and what opportunities are now available - or unavailable. On Indeed.com, one of the most popular job search sites, after performing a search for 'Information Science' on November 30th, 2021, many of the most popular results relate to concepts and principles of Information Science - Information Technology management and director positions, Information Systems Analyst positions, and Database Administrator positions are some of the most relevant results, to name a few. However, a lot of these results do not directly specify the degree as a requirement for acceptance - we are frequently that 'related field' option. Dr. Jed Brubaker, a member of the Information Science Founding Faculty at CU, once told Raghav that the degree we have is for jobs that have not yet been created, something that is reflected in the ways that Information schools have had to adapt from existing fields - an example being Library Science - as computing has become more pervasive (J. Brubaker, personal communication, 17 October 2019). We believe that now, as the department is undergoing academic review after its establishment in the fall of 2015, is the time to assess where the graduates have ended up and, with the guidance of the department, figure out potential shortcomings that the degree program has (University of Colorado Boulder, n.d.).

Ethical and Social Implications

The project will help students figure out what fields might work best with this major/minor. Additionally, if done correctly, we will be able to help out the department with much-needed data on how well INFO majors are finding jobs. Unintended but welcome results

may be that we find that graduates weren't properly prepared in terms of presenting themselves as Information Scientists, something that could involve resume building, interview skills, and/or project showcasing. If this does end up being the case, we could use the information we gain from our research to make suggestions to the department regarding advising current INFO students on how to best present themselves when applying for work.

Related Work

There are a number of other Information schools that are already well-established, including UW Information, UC Berkeley Information, and University of Michigan School of Information, or UMSI (Berkeley School of Information, n.d., University of Michigan School of Information [UMSI], 2021; University of Washington, n.d.). UMSI has a lot of information about career outcomes for recent UMSI graduates, including job search methods graduates found most effective and the skills and curricular experiences that they reported having been the most beneficial. In terms of the top industries Information Science graduates are working in, technology was the top field with 29% of graduates having jobs there, with other top contenders being consulting at 23% of graduates and financial services at 18% (UMSI 2021). In terms of other career-related factors, 95% of graduates primarily credited job success to internships and courses taken as part of the INFO major, and the most valuable skills from the School of Information that graduates attributed to job outcomes and success were collaboration and teamwork, critical thinking and problem-solving, communication, and project management (UMSI, 2021). Our project overlaps to a certain extent with this existing data - while our sample size is smaller, we were able to gather more detailed information about individual Information Science majors and their experiences. Compared to the UMSI job data, we gathered more information about the process of applying to and getting accepted for a position as well as data not only about the specific positions that graduates received but also the positions they had hoped to have following graduation as well. In line with UMSI's data, our results also indicated that networking was a very beneficial way for recent graduates to find jobs. Additionally, data from the University of Arizona and SUNY Oswego on careers for Information Science majors shares similarities with our data - for example, many of the jobs listed on each university's website and jobs respondents listed on our survey involve analysis in various career fields - data analysts, computer systems analysts and systems analysts, quality assurance analysts, and other related fields (SUNY Oswego, n.d.).

Method

We brainstormed survey questions that we felt were the most likely to give us the best chance of answering the questions that we had. As part of our survey, we asked respondents how the graduate job search was for our respondents (some examples: "Did you have a job secured before graduation?", "How many jobs did you apply for?", and "How many jobs did you hear back from?") as well as questions that were specifically about Information Science as a

major at CU Boulder (examples: “How did you explain what Information Science was to any of your employers?”, “How applicable were the skills or knowledge you attained as an Information Science major or minor at your current position?”, and “What is something you would like to tell current or future Information Science majors?”). We also collaborated with the INFO department to address and answer any questions that they may have had. Interview questions followed similar formats to the ones that we had learned about and put together throughout various courses in this major. Additionally, we compared our findings to current employment data regarding this major. We launched our survey through Qualtrics - their analysis features saved us time and allowed us to tell the story from the data we gathered more accurately. Most of our survey building stayed in a Google document for easier access and editing - given that multiple people throughout the department would be contributing to and providing feedback on these questions, this was a necessity. One limitation of conducting a survey is that surveys tend to only provide specific questions for the respondent to answer rather than providing many more opportunities for further discussion that other, more flexible formats could provide. Another limitation was not being able to actively view the final flow of the survey, but we believe that keeping the process in the Google document as long as possible ultimately worked out well for us, as this format gave the ARPAC committee a way to easily comment on the existing framework and engage in dialogue with us. Deployment of the survey was done with the help of Max Gannett, the CMCI Student Government President; Max curated the survey email and helped facilitate the email distribution portion of the survey.

Research Findings and Deliverables

As a first step, we collected and analyzed data from the Bureau of Labor Statistics. As a relatively new major, this initially required some educated guesses based on information gathered from professors, students, working professionals, and Google searches posted on various job sites and set to be visible to anyone for three weeks. The information we gathered from these avenues allowed us to choose plausible positions and job categories for our research.

Though an argument can be made for Information Science students having access to a very high number of job positions, we primarily consider that there are slightly different tracks available to Information Science Students that overlap and have a core, common skill set. For example, three main tracks to examine are Qualitative Research (Survey Design, Textual Analysis, and Interview Design), Data Analytics (Python Data Science Libraries, Machine Learning, and Database Administration), or Design Specialization (Product Design, User Experience Design, or Quality Control). Similarly, the 60 positions chosen as plausibly open to Information Science graduates exist on a spectrum where most may be open to the majority of STEM graduates (Technical Writer, Project Coordinator, or Cost Estimator), some are open to Computer Science or Data Science students (Software Developer, Database Administrator, or Network Administrator), and some are very likely to fit the skill set of Information Science Students

(Analytics, UX Design, or Survey Researchers). These general findings were used to support, validate, and confirm or contextualize our survey and interview results.

In total, we received 19 responses to our survey, 8 of which were started but not completed. From the respondents who studied Information Science, the majority reported having been an INFO major, while only two had Information Science as their minor, having majored in Advertising, PR and Media Design (APRD) or Finance and Accounting. Additionally, out of the respondents who had INFO as their major as well as a different minor, over half had business-related minors with two graduates having minored in Communication and one having majored in Astronomy. Out of the respondents who answered our question about what job title they hoped to get following graduation, over half reported wanting to be Analysts and one-third having wanted to become Business Intelligence (BI) Developers. In terms of what jobs respondents actually obtained after graduating, people reported having become Technical Consultants, Client Service Support, Real Estate Appraisers, Workforce Analysts, Marketing Managers, and working in various areas of IT. These positions had a relatively high incidence of availability, something that was consistent with our data from the Bureau of Labor Statistics (BLS), which does not yet list BI Developers but breaks aspects of that position down into various Analyst positions. However, the BLS did name the Information Technology positions nearly identically to how survey respondents did, but some generalization, such as paraphrasing "Real Estate Appraiser" as "Cost Estimator," was needed to match survey data to BLS findings. The positions were ranked quite high in terms of projected job growth with Client Service Support projecting $844,000, Real Estate Appraisers projecting $199,400, Workforce Analysts projecting $907,600, and Marketing Managers projecting $740,900 annually.

Figure 1

Job Title vs. Projected Change in Employment

Job Name	Projected C	Projected Change in Employment in % (202
Logisticians	56,400	30%
Project Coordinator	538,000	25%
Operations Research Analysts	25,600	25%
Quality Assurance Analysts	409,500	22%
Software developers	409,500	22%
Testers	409,500	22%
Market Research Analysts	163,600	22%
Forensic Science Technicians	2,700	16%
Management Analysts	124,400	14%
Web Developers	25,500	13%
Digital Designers	25,500	13%
Tech journalist	6,100	12%
Technical Writer	6,100	12%
Art Directors	10,800	11%
Computer and Information Systems Managers	52,700	11%
Public Relations Specialists	31,200	11%
Social media strategist	31,800	10%
Advertising, Promotions, and Marketing Managers	31,800	10%
Computer Support Specialists	72,200	9%
Database Administrators and Architects	13,200	8%
Environmental Scientists and Specialists	7,300	8%
Computer System Analysts	42,800	7%
Mechanical Engineers	20,900	7%
Occupational Health and Safety Specialists and Technicians	8,800	7%
Industrial Designers	1,800	6%
Health and Safety Engineers	1,500	6%
Budget Analysts	2,500	5%
Network and Computer Systems Administrators	18,800	5%
Industrial Production Managers	10,000	5%

Note. Projected change in employment is shown both as a percentage and as a number.

From the graduates who answered our question about what salary range they received after graduation, results were varied; there were more respondents who received a salary in the range of $40,000 to $65,000, but several graduates also received higher salaries ranging between $65,000 and $80,000 and $80,000 and $95,000.These findings arguably raise concerns about the accuracy of the Bureau of Labor Statistics's data, which lists the median salary for a person with a Bachelor's degree and no experience as $88,822 annually. We do not have sufficient data to calculate a true median, but based on the spreads of $40,000, $65,000, $80,000 and $95,000 from the Qualtrics data, the median salary comes out to about 65,000 per year, which is to say that the true median is likely between $50,000 and $80,000 annually. However, it is also important to note that the most frequently skipped questions on our survey were salary-related, indicating that our collected data may not have been precise enough to compare directly to the BLS's data.

Figure 2

Comparison of Median Salary per Year for Education Work Levels and Work Experience Required in Related Occupation.

Stat - 5 Stat - 1. Comparison of Median Salary/year for Education Levels and Work Experience Required in Related Ocupation. The second column displays and compares the variations in Salary of all levels to the Overall Average Salary i.e. $ 84,555.			
Entry Level Education		Median Salary/year (Average)	dian Salary/year (Average Chang
Bachelor's degree	$	88,822.13	1.00
5 years or more	$	121,866.67	1.37
Less than 5 years	$	88,828.00	1.00
None	$	83,313.89	0.94
Grand Total	$	88,822.13	1.00

Note. The second column displays the variations in salaries from the overall computed average salary.

Perhaps the survey question that we were most curious about the answers to was our question about how respondents explained what Information Science was to their employers. All of the respondents who answered this question mentioned data in one form or another - data science, data analysis/analytics, data visualization - with the majority of respondents reporting explaining how Information Science had real-world applications and overlapped with other disciplines. In particular, several graduates referenced user-centered design in one way or another; one talked about Information Science as creating a human data-focused skillset, with two others mentioning user-centered design and user experience respectively. Other respondents also mentioned computer science, with one person describing the field as "computer science but with less programming."

Based on the results from our survey and responses from graduates who were open to being interviewed, we were able to take our next steps in terms of our iteration: conducting individual interviews. One respondent we interviewed was Ryan Clure, currently working as a Workforce Analyst after having majored in Information Science. Throughout the interview, Ryan spoke about the importance of analytical skills/skills learned in school and pursuing your interests - being interested in your work, doing work that interests you - as part of a career, with slightly less of a focus on career progression and taking action based on the analysis you complete as part of your work. Ryan shared his experience about what he'd been working on in school and what projects had interested him being relevant to the interviewers during his initial interview for the internship that led to him receiving a full-time job offer rather than there being an emphasis on what he could bring to the company, something that we found interesting to hear. Ryan also emphasized being able to translate your work - the analysis you complete on a certain problem or issue - into action, something that may include presenting your work to people who intend to take your analysis and recommendations for action into consideration. These responses provide a unique perspective on the process and expectations of getting a job as an Information Science major that the survey results alone would not have given us, making this part of the project beneficial in a way that we otherwise may not have had.

Conclusion

There are several next steps we could take with the information we gathered from our survey, from informing current INFO students about the results to advising new graduates on

how best to explain Information Science to prospective employers. With more time and resources, we might deploy a similar survey on a larger scale and include current Information Science students as well as conducting more interviews with graduates who complete the survey.

We were able to organize ourselves as a team by maintaining channels of communication and checking in with each other frequently. We also worked together on shared documents that allowed us to make changes and comments on each aspect of the project, in addition to allowing us to collaborate effectively. Much of what was effective for us were the meetings we had - both our meetings as a team and our check-ins with Assistant Professor Ricarose Roque. As mentioned previously, the multiple methods of communication we had, both between ourselves and with INFO faculty members, proved invaluable to our project development and execution. Initially, many of the challenges were in question formation. Again, if we had had more time, we may have been able to conduct preliminary interviews and perform textual analysis to isolate certain themes and refine our goals based on responses and feedback. Furthermore, our sample size of graduated students is small, and we did not know how best to reach them or get a good return rate. At this point, the department decided to help, which was invaluable to our project.

Our research would have greatly benefited from more timing and the addition of funding. During our work, we were informed that the pool of Information Science graduates (Major and Minor) was small. The degree is relatively new, so this was to be expected, but it wasn't until the deployment of the survey and the subsequent amount of responses that we truly began to see what we were working with. As mentioned before, we had eight individuals that started their survey but did not complete it - one might wonder if an incentive would have made a difference in terms of respondents' survey completion. Ultimately, we believe that as a whole, our findings showed a great respect and outlook for the major. Having more resources in the future would help expand the existing research.

In terms of advice we might give to future INFO seniors taking this class, we would all agree that maintaining a sense of where you are in terms of your planned timeline (and your working timeline, if the two differ) is key to meeting your goals throughout the class. We also agree that communicating with one another frequently and understanding each individual teammate's goals and responsibilities as well as your own is ultimately beneficial to all members of the team.

Assistance

Many faculty members in the Information Science department, including Ricarose Roque, Abe Handler, and Max Gannett, were a huge help in terms of question engineering, survey design, and survey deployment. We are deeply grateful for their assistance and how their contributions granted us the ability to focus on design.

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