DATA-DRIVEN CURRICULUM DEVELOPMENT: USING PUBLICLY AVAILABLE DATA TO IDENTIFY THE WORKFORCE NEEDS FOR UNDERGRADUATE BUSINESS STUDENTS

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ABSTRACT

Assuring the alignment of business education with labor market needs is crucial for preparing graduates with the necessary skills for their future careers. Combining data from the U. S. Census Bureau's American Community Survey and the U. S. Department of Labor's Occupational Information Network, this paper examines the occupational outcomes and required skills of jobs most commonly held by undergraduate business majors. Significant diversity in occupational outcomes for undergraduate business graduates exists, which suggests a need for a curriculum providing a broad range of skills. Additionally, by utilizing data from occupational analysts on the skills required in jobs and supplementing these data with information about in-demand technology skills from real-world job postings, stakeholders in colleges of business can ensure their curriculum is aligned with the current needs of the labor market.

Keywords: *business curriculum, skill requirements, O*NET, occupational outcomes*

INTRODUCTION

According to several polls, students' primary motivation for attending institutions of higher education in the United States is to improve their job prospects (Higher Education Research Institute, 2012; Strada Education Network & Gallup, 2018). Several states have developed explicit goals with regard to the skills of graduates of state institutions of higher education. (Colorado Department of Higher Education, 2021; Texas Higher Education Coordinating Board, 2015). For example, one goal of the Texas Higher Education Coordinating Board's current strategic plan is "by 2030, all graduates from Texas public institutions of higher education will have completed programs with identified marketable skills" (Texas Higher Education Coordinating Board, 2015, p. 22). This plan requires state institutions to define and assess marketable skills for each of their program offerings.

Additionally, some accrediting bodies emphasize the importance of aligning curriculum with labor market needs. The Association to Advance Collegiate Schools of Business (AACSB) standards require that accredited business schools align their curriculum with the relevant skills in the workforce, including the use of appropriate technologies used in the business environment (AACSB International, 2020). Students, policy makers, and business accrediting bodies demand curriculum that is current, relevant, and aligned with workforce needs. This alignment is complicated by an ever-changing job market, as well as advances in technology that fundamentally change job tasks and the required skills of workers. However, there are several

methods by which institutions can ensure that their offerings meet the needs of employers, prospective students, accrediting bodies, and state legislatures. This paper provides a method for stakeholders of colleges of business to use publicly available data to help ensure their curriculum prepares graduates with the in-demand skills required in the current and future labor market.

LITERATURE REVIEW

Education in business has evolved substantially in the United States over the past several centuries. At first, training in commerce was conducted using an apprenticeship system; later private business schools offered coursework in vocational skills useful in business (Applegate, 2022). Even later, traditional colleges and universities began to offer a business education, in a move that attempted to shift the focus away from purely vocational training towards a more comprehensive college education (Khurana, 2010). Founded in 1881, the Wharton School claims to be the world's first collegiate business school, with a foundational goal of preparing graduates with the knowledge to become "pillars of the State, whether in private or in public life" (University of Pennsylvania, n.d.).

Curriculum in colleges of business has changed over time, as the labor market itself has transformed. Much has been written by economists about the many ways new technologies have impacted the labor market (Acemoglu & Autor, 2011; Damelang & Otto, 2024; Hötte et al., 2023). One theme from this literature is the idea that new technologies replace human labor for certain tasks, while increasing the productivity of workers in other functions, therefore increasing the demand for these activities (Acemoglu & Restrepo, 2019; Autor, 2015). For example, the accounting profession has undergone substantial changes since the widespread adoption of the personal computer, and future technologies including artificial intelligence are forecasted to further change the nature of accounting jobs. (Cunha et al., 2022; Moll & Yigitbasioglu, 2019; Kee, 1993). Of course, accounting jobs have not been eliminated due to the adoption of new technologies including the widespread adoption of personal computers and spreadsheet software. Rather, the nature of the tasks of a typical accountant have changed and will continue to change in the future, due to new and unforeseen innovations. If colleges of business want to continue to provide current and relevant training, the curriculum will need to adapt to an ever-changing world.

For decades, some researchers have been critical of the relevance of business school training (Leavitt, 1989; Pfeffer & Fong, 2002). When implementing a curriculum that provides an occupationally relevant education, one obviously would need to identify the related target occupations of graduates. Research suggests that student major selection is often related to student occupational goals, even though many programs are not explicitly aligned with one specific job (Patnaik et al., 2020). Although some undergraduate majors like nursing or elementary education tend to lead to employment in a specific occupation, most college program offerings lead to at least some occupational diversity (Ransom & Phipps, 2017). This diversity can add complexity to curriculum development, in that undergraduate program offerings do not typically align with exactly one job. While engineering, nursing, and education majors tend to have high occupational distinctiveness, business majors typically display more variety in occupational outcomes, with the exception of accounting programs. (Ransom & Phipps, 2017).

Institutions of higher education can individually track their graduates and collect occupational information in order to understand the types of jobs their graduates hold. Often this approach can suffer from problems of selection bias, as not all students will respond to alumni

surveys, or maintain LinkedIn or other social media profiles that can be tracked. As an alternative, the Bureau of Labor Statistics (BLS) and the National Center for Educational Statistics (NCES) jointly created a crosswalk between Standard Occupational Classification (SOC) and Classification of Instructional Programs (CIP), in order to link college program offerings to related occupations. This crosswalk is most useful for educational program and workforce alignment where degrees and occupations are closely aligned with one another (Goldman et al., 2015).

For most occupations there is typically more than one related program listed. For example, for the SOC for human resource managers, six separate CIP programs are listed as related to that one occupation. Most CIP programs also list multiple occupations in the crosswalk, as graduates of programs feed into multiple jobs. Although this linkage from jobs to degrees can be useful, it also does not provide any indication of the proportion of graduates that are hired into each occupation.

An alternative is to consider the business curriculum as a whole, rather than these more disaggregated CIP codes. David et al. (2011) conducted a content analysis of corporate job descriptions, student résumés, business course syllabi, and textbooks to examine the alignment of curriculum with entry-level jobs for undergraduate business majors. Using a sample of 200 entry-level job postings, 100 syllabi, and a sample of student résumés from five universities, the authors argue that there is a substantial gap between what is taught in colleges of business and the skills sought by companies. Specifically, they argue business colleges should revise their missions to become more practitioner-oriented, and shift the curriculum away from a focus on theory and more towards practice. The authors do note that their study may not be representative of colleges of business overall, as the data only came from five universities. (David et al., 2011).

Other evidence suggests the continued value of broad higher-order thinking skills in the labor market, and that schools are correct in focusing on these types of skills. A survey developed by the American Association of Colleges and Universities and administered to a sample of 1010 employers in May 2023 found that eight in ten employers either weakly or strongly agreed that higher education institutions were preparing graduates to success in the workforce (Finley, 2023). The survey did identify several gaps in employers' perceptions of certain skills, with weaknesses identified in oral and written communication, critical thinking, and adaptability and flexibility of recent graduates (Finley, 2023). Other surveys corroborate the value to employers of broad skills such as problem-solving, communication, and flexibility (National Associate of Colleges and Employers, n.d.).

APPROACH AND DATA

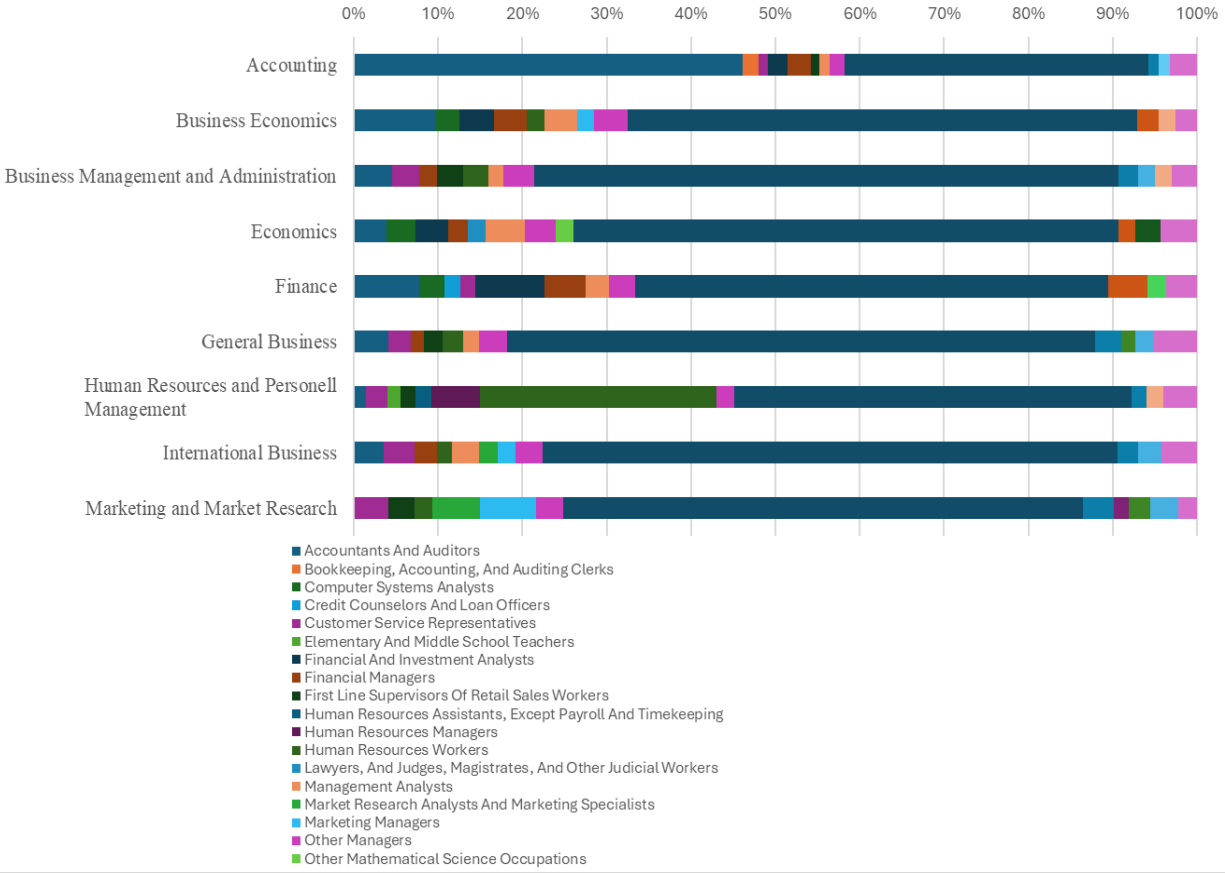
American Community Survey

Rather than using data on graduates' employment history for a particular institution of higher education or the federal government's SOC to CIP crosswalk of programs to jobs, one can combine several sources of publicly available data to help understand the labor market needs associated with particular undergraduate business majors. These data can be used either as a stand-alone measure of the skills required for particular degrees, or to supplement other sources in curricular development and assessment. This process involves first linking undergraduate business programs to jobs, and then collecting information about the skills required within these particular occupations. First, data were extracted from the U. S. Census Bureau's American

Community Survey (ACS). The survey asks a variety of social, demographic, educational, and economic questions of members of approximately 3. 5 million households annually (United States Census Bureau, 2023). Since 2009, the ACS has inquired about field of study for those respondents who report having earned a bachelor's degree or higher. This question allows for the linkage of college major to employment information. Specifically, one can link college majors of survey respondents to specific Census Bureau occupations that are also collected in the ACS.

Figure 1

Most Commonly Held Jobs for Select Undergraduate Business Programs (5-year ACS, respondents 30 Years or Younger)



In order to isolate occupations of recent graduates, data from the most recent five-year ACS public use microdata sample was used, with information extracted on occupation and field of degree for individuals who report being 30 years old or younger. This age restriction exists so that the sample is restricted to relatively recent graduates, as the educational requirements of occupations has been noted to have changed over time (Goldman et al., 2015). In other words, a worker decades ago may have not needed a bachelor's degree to gain entry to certain occupations, whereas there is now an expectation that new employees hold a four-year degree. It is also possible that certain majors once provided entry to a particular occupation, but recent graduates are expected to have degrees in other specific degree programs. It should be noted that the ACS asks about the first bachelor's degree, so the occupational data are only linked to the

first degree earned, and workers may have more than one undergraduate degree and may also hold advanced degrees.

Figure 1 provides a visualization of the ten most common occupations held by graduates of nine of the most commonly offered business degrees, using the most recently available 5-year ACS data. Not all business majors are listed in this figure, and the Census Bureau does collect information for additional degrees in programs such as agribusiness, actuarial science, logistics, management information systems, and heath care management if stakeholders want to understand the labor market needs associated with occupations related to these additional majors. Both economics and business economics are included in Figure 1 as some colleges make distinctions between these degrees and may offer one or both of the programs. As an additional aside, the Census Bureau uses its own occupational code system, but provides a crosswalk to SOC codes, so that jobs can be linked to other commonly used data sources. Several patterns emerge from the data in Figure 1. First, as expected a few programs more carefully align with one or two specific jobs, whereas other programs have substantially more occupational diversity. For example, more than 46 percent of respondents with a first bachelor's degree in accounting report working as an accountant or auditor in the ACS. Likewise, almost 36 percent of survey respondents with human resource and personnel management degrees report being employed as either human resource managers, workers, or assistants. Even among graduates of these two business majors, there is substantial occupational diversity; a majority of graduates in these programs do not report working as accounting or human resource professionals, respectively. Other business majors listed demonstrate even more occupational diversity. Almost 70 percent of general business majors work in occupations other than the ten most commonly listed. These data reenforce the idea that business schools may wish to provide programs with a curriculum that focuses on skills outside of the most obviously linked occupation for each major.

Occupation Skills Data

Using occupational code crosswalks, occupational data from the ACS can be linked to other data sources that provide information about the skills required in various jobs. The U. S. Department of Labor's Office of Policy and Research developed the Occupational Information Network (O*NET) in the late 1990s in order to replace the previously used Dictionary of Occupational Titles. (Rounds et al., 1999). O*NET provides a variety of information about occupations, including the required knowledge, skills education, experience, training, and tasks required for each job. The database was developed to help support individuals in making career and educational decisions as well as to aid policymakers and researchers in their study of labor markets. O*NET data is mostly available for jobs that have associated SOC codes from the BLS, although there are some exceptions as noted later in this paper. O*NET also provides a comprehensive list of real-world job titles, which can be particularly useful in linking the government occupational codes to real-world job advertisements. Crucially, O*NET is continually updated to provide information about the skills, educational requirements, and tasks that typically exist for each occupation.

Among other items, O*NET contains occupation-specific information about required jobs skills, including broad skills that are deemed essential to a variety of jobs. At their most general, the O*NET skills are categorized into seven broad groups of skills: content, process, social, complex problem-solving, technical system, and resource management skills (Fleisher & Tsacoumis, 2012). These skills are further disaggregated into 35 separate job skills within the

aforementioned seven broad categories. For example, social skills include the sub-skills of social perceptiveness, coordination, persuasion, negotiation, instructing, and service orientation (Fleisher & Tsacoumis, 2012). Eight occupational analysts rate both the importance and level of each of the 35 skills for each O*NET occupation (Burgoyne et al., 2021). Importance measures how critical the skill is for successfully performing a particular job, while level refers to the degree of proficiency a worker needs in that skill or that particular occupation. As an example, 'speaking' is defined in O*NET as talking to others to convey information effectively, and is a sub-skill of the broad 'content' skill category. (United States Department of Labor Employment and Training Administration, n.d.) Speaking is rated as an important skill for both lawyers and paralegals, but occupational analysts rate the level of speaking required as higher for lawyers as compared to paralegals. Although both jobs require the ability to verbally convey information effectively to judges, clients, and juries, occupational analysts only rate the level of speaking skill required as average for paralegals, while they assess that lawyer must be able to speak effectively at a very high level. To complicate matters, importance is rated by analysts on a scale of 1-5, while level is assessed using a 0-7 scale. O*NET documentation provides a method for converting these separate ratings into a standardized score on a 100-point scale, in order to make the ratings more comprehensible to users (United States Department of Labor Employment and Training Administration, n.d.). As an example, analysts rate the importance of mathematics skills at 100 for mathematicians on this standardized scale, while they rate mathematical skill as 0 in importance for actors.

In recent updates, O*NET also provides a list of in-demand technology skills, which are software or technology requirements that are frequently included in employer job postings online (Lewis & Morris, 2022). The Department of Labor partnered with Burning Glass Technologies, now called Lightcast, in order to collect information web-scraped from online job postings. Although Lightcast is a proprietary data source, annual information about these in-demand skills is made publicly available in the O*NET database, along with other related information for each occupation. In-demand technology skills are defined as technology and software identified by O*NET that appear in more than five percent of all unique, unduplicated online job postings for that occupation during a calendar year. In this case, the most recent data from 2023 are utilized. Occupations with fewer than 50 unique occupations are omitted from inclusion in these data (Lewis & Morris, 2022).

Table 1
Most Common Occupations for Graduates of Business Programs (Respondents 30 Years or Younger from 5-year ACS)

ACS Occupation Title	Frequency Listed in Programs	Exact Match (O*NET)	Sample of Reported Job Titles
Other Managers	9	no	This category represents jobs with characteristics which do not fit into one of the O*NET-SOC occupations
Accountants And Auditors	8	yes	Accountant, Auditor, Certified Public Accountant, Cost Accountant, Financial Auditor, Internal Auditor
Financial Managers	7	yes	Accounting Supervisor, Branch Manager, Business Banking Manager, Credit Manager, Financial Planning Manager
Management Analysts	7	yes	Business Analyst, Business Consultant, Management Analyst, Management Consultant
Customer Service Representatives	7	yes	Account Representative, Client Services Representative, Customer Care Representative, Customer Service Agent,
Human Resources Workers	6	yes	Corporate Recruiter, Employment Representative, HR Analyst, HR Coordinator HR Generalist
Retail Salespersons	6	yes	Customer Assistant, Retail Salesperson, Sales Associate, Sales Consultant, Sales Representative
First Line Supervisors of Retail Sales Workers	5	yes	Department Manager, Department Supervisor, Shift Manager, Store Manager
Financial And Investment Analysts	4	no	Analyst, Credit Products Officer, Financial Analyst, Investment Analyst, Portfolio Manager, Securities Analyst, Trust Officer
Sales Representatives, Wholesale and Manufacturing	4	no	Inside Sales Representative, Marketing Representative, Sales Representative
Marketing Managers	3	yes	Account Supervisor, Brand Manager Marketing Coordinator, Marketing Director, Marketing Manager, Product Manager
Personal Financial Advisors	3	yes	Certified Financial Planner (CFP), Financial Advisor, Financial Counselor, Financial Planner, Portfolio Manager, Wealth Advisor
Computer Systems Analysts	3	yes	Applications Analyst, Business Systems Analyst, Computer Systems Analyst, Computer Systems Consultant
Secretaries And Administrative Assistants, Except Legal, Medical, And Executive	3	yes	Administrative Assistant, Administrative Specialist, Office Assistant, Secretary, Staff Assistant
Market Research Analysts and Marketing Specialists	2	yes	Business Development Specialist, Communications Specialist, Market Analyst, Market Research Analyst, Market Research Consultant, Market Research Specialist, Market Researcher
Sales Managers	2	yes	District Sales Manager, Regional Sales Manager, Sales and Marketing Vice President (Sales Director, Sales Manager,

RESULTS

Broad Occupational Skills

Table 1 provides more detail about the specific occupations held by graduates of business programs. Specifically, the table shows the frequency with which occupations are listed in the top ten occupations of each of the nine selected business programs, for workers 30 years of age or younger. Only the Census Bureau occupation 'other managers' makes the top ten occupations for each of the nine selected majors, although there is substantial overlap across various business programs. 'Accountants or auditors' ranks among the top ten most commonly reported occupations held by younger workers in eight of the nine programs, for example. Table 1 also includes a sample of reported job titles from O*NET, which can help provide some real-world context for the specific occupational categories. Not all ACS occupations align perfectly with the O*NET data. 'Other managers' include a wide range of jobs that have little in common in terms of skills and tasks, while 'financial and investment analysts' and 'sales representatives, wholesale and manufacturing' include multiple occupations in O*NET and cannot be linked directly to a specific O*NET occupational skillset. Therefore, these three ACS occupations will be excluded from further analysis. In order to understand the required skills of business graduates as a whole rather than a particular major, any occupation only in the top ten most common jobs for exactly one major are also excluded. Therefore, there are 13 occupations remaining that were chosen to be linked to O*NET skills. These 13 occupations are denoted with a 'yes' in the third column of Table 1 and will be the target group of jobs for the analysis of broad skills for business majors.

Table 2 provides a summary of the skills in O*NET associated with these 13 occupations, as assessed by occupational analysts in the Department of Labor. The ratings for importance of and level are standardized to a 100-point scale, and the skills are sorted by the number of the common occupations rated as requiring at least average importance of the particular skill. Table 2 only includes 27 of the 35 broad skills, as eight of the skills are not rated as of at least average importance in any of the 13 target occupations. These include skills such as equipment maintenance, repairing, and management of material resources, among others that are typically not required of occupations held by typical business graduates. Eight skills are assessed as at least of average importance in all 13 occupations: active listening, critical thinking, monitoring, reading comprehension, social perceptiveness, speaking, time management, and writing. The O*NET data provides evidence that these broad skills are the most important for jobs that are typically held by younger business graduates.

Many of the skills listed in Table 2 are similar to common learning goals of undergraduate business programs. While accrediting bodies are often loathe to specify exactly what skills higher education institutions should target, there is some commonality across institutions in selecting learning goals, and several of those common goals align with the skills listed in Table 2. Woodside (2020) conducted a meta-analysis of undergraduate learning goals across AACSB accredited business schools and found substantial commonality across institutions. Woodside found written communication, oral communication, application of knowledge, and ethical understanding and reasoning to be the most common learning goals.

Teamwork, global knowledge, critical thinking, analytical thinking, evidence-based decision making, and the ability to solve problems were also common learning goals listed in the meta-analysis (Woodside, 2020). Of the eight broad skills identified in all of the related occupations, several seem to be aligned with common learning goals of business schools. Speaking and writing skills are directly linked to oral and written communication. Social perceptiveness is defined as being aware of others' reactions and understanding why they react as they do, which may be part of working effectively in teams, for example. (Fleisher & Tsacoumis, 2012).

Active listening, monitoring, and time management do not commonly appear as learning goals among AASCB accredited institutions, and potential could be areas where programs could find opportunities to strengthen the skills of the graduates. Of course, it is also possible that programs may already provide training in these skill areas even if they are not explicit goals incorporated into formal assessment documentation. Negotiation and persuasion are also rated as above average in importance in 10 of the 13 target occupations. In terms of the level of the skill required, only active listening was rated as above average in each of the 13 occupations. Stakeholders can find definitions of each of these broad skills in O*NET documentation (Fleisher & Tsacoumis, 2012).

Table 2
Importance and Level of Skills Required for Most Common Occupations of Business Majors (Respondents 30 Years or Younger from 5-year ACS)

	Importance				Level			
	Sum	**Mean**	**Max**	**Min**	**Sum**	**Mean**	**Max**	**Min**
Active Listening	13	73	78	69	13	57	63	52
Critical Thinking	13	68	78	50	12	56	61	45
Monitoring	13	59	72	50	10	54	68	43
Reading Comprehension	13	69	78	50	11	57	66	45
Social Perceptiveness	13	61	72	50	7	50	59	43
Speaking	13	73	78	69	12	56	59	45
Time Management	13	56	66	50	4	47	55	41
Writing	13	64	75	50	11	53	59	43
Coordination	12	57	72	47	6	48	59	41
Service Orientation	12	61	75	47	6	49	55	41
Active Learning	11	58	72	47	7	51	59	41
Complex Problem Solving	11	60	75	44	9	50	57	36
Judgment and Decision Making	11	61	75	47	9	51	59	37
Negotiation	10	52	72	35	5	46	55	30
Persuasion	10	57	78	31	7	50	63	30
Systems Analysis	9	50	69	25	7	45	57	27
Learning Strategies	8	47	56	28	4	44	54	27
Systems Evaluation	8	49	72	25	5	45	59	25
Mathematics	7	47	67	25	3	43	57	23
Instructing	6	49	66	28	5	46	52	34
Management of Personnel Resources	5	48	69	31	4	43	57	30

Management of Financial Resources	3	33	53	10	3	32	54	7
Operations Analysis	3	34	60	6	3	31	55	4
Operations Monitoring	1	23	50	13	0	20	45	7
Programming	1	21	56	6	1	18	57	4
Quality Control Analysis	1	22	50	3	1	19	50	2
Troubleshooting	1	7	53	0	1	7	55	0

Table 3
*In-demand Technology Skills for Most Common Occupations of Business Majors (O*NET and Lightcast Data)*

	Technology	**Example Technology**
Accountants and Auditors	Spreadsheet software	Microsoft Excel
	Office suite software	Microsoft Office software
	Electronic mail software	Microsoft Outlook
	Presentation software	Microsoft PowerPoint
Computer Systems Analysts	Content workflow software	Atlassian JIRA
	Web platform development software	JavaScript
	Spreadsheet software	Microsoft Excel
	Office suite software	Microsoft Office software
	Presentation software	Microsoft PowerPoint
	Object-oriented development software	Oracle Java and Python
	Enterprise resource planning ERP software	SAP software
	Data base user interface and query software	Structured query language SQL
Customer Service Representatives	Spreadsheet software	Microsoft Excel
	Office suite software	Microsoft Office software
	Electronic mail software	Microsoft Outlook
Financial Managers	Spreadsheet software	Microsoft Excel
	Office suite software	Microsoft Office software
	Electronic mail software	Microsoft Outlook
	Presentation software	Microsoft PowerPoint
First-Line Supervisors of Retail Sales Workers	Office suite software	Microsoft Office software
Human Resources Managers	Spreadsheet software	Microsoft Excel
	Office suite software	Microsoft Office software
	Electronic mail software	Microsoft Outlook
	Presentation software	Microsoft PowerPoint
Management Analysts	Spreadsheet software	Microsoft Excel
	Office suite software	Microsoft Office software
	Presentation software	Microsoft PowerPoint
	Process mapping and design software	Microsoft Visio
	Database user interface and query software	Structured query language SQL
Market Research Analysts and Marketing Specialists	Graphics or photo imaging software	Adobe Photoshop
	Data mining software	Google Analytics
	Spreadsheet software	Microsoft Excel
	Office suite software	Microsoft Office software
	Electronic mail software	Microsoft Outlook
	Presentation software	Microsoft PowerPoint
	Customer relationship management software	Salesforce software
	Video creation and editing software	TikTok
Marketing Managers	Spreadsheet software	Microsoft Excel
	Office suite software	Microsoft Office software

	Presentation software Customer relationship management software	Microsoft PowerPoint Salesforce software
Personal Financial Advisors	Spreadsheet software Office suite software Presentation software	Microsoft Excel Microsoft Office software Microsoft PowerPoint
Sales Managers	Spreadsheet software Office suite software Electronic mail software Presentation software Customer relationship management software	Microsoft Excel Microsoft Office software Microsoft Outlook Microsoft PowerPoint Salesforce software
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	Spreadsheet software Office suite software Electronic mail software Presentation software Word processing software	Microsoft Excel Microsoft Office software Microsoft Outlook Microsoft PowerPoint Microsoft Word

In-demand Technology and Software

As with broad skills, the focus of analysis will be on the most commonly held jobs of younger business graduates. As previously mentioned, data on in-demand technologies are drawn from real-world job postings from Lightcast for the 2023 calendar year. Of the 13 previously described commonly held occupations, all have at least one identified in-demand technology or software skill, except for retail salespersons. Although this occupation is commonly held by younger business graduates, the BLS notes that no formal educational credential is required to become a retail salesperson, and this may not be a job that business schools target for their graduates (Bureau of Labor Statistics, U. S. Department of Labor, 2023). Table 3 provides a summary of the in-demand technology and software for the remaining 12 target occupations. The skills are presented as reported by O*NET, although there is some overlap in some of the in-demand skills. For example, all 12 occupations list office suite software as in-demand, while some job postings also reference software itself typically included in an office suite software program such as e-mail, word processing, presentation software, and spreadsheets. In fact, spreadsheet software is listed separately in 11 of the occupations as in-demand, while presentation software is listed separately for 10 of the jobs. Although it may seem obvious that workers need to be able to use office suite software in their jobs, not all occupations have job postings referencing these technologies. Of the 923 separate occupations where data is collected by O*NET on in-demand technology, only 347 occupations list office suite software as an in-demand technology; that number is reduced to 316 and 163 for spreadsheet and presentation software, respectively. However, for the types of jobs that business graduates hold, these basic software skills seem to be in high demand.

Beyond basic office suite technologies, the list of occupations in Table 3 differ somewhat in terms of software skills that are currently rated as in-demand. Customer relationship management software was rated as in-demand for jobs in marketing and sales, whereas Structure Query Language (SQL) appeared in a substantial number of job postings for both management and computer systems analysts. Not surprisingly, computer systems analyst job advertisements also reference various programming languages such as Python, Java, and JavaScript.

CONCLUSION

The analysis of data from ACS and O*NET provide several key stylized facts. First, business graduates exhibit significant occupational diversity, with graduates finding employment in roles that require a variety of general skills. Second, many of the identified broad skills are already targeted by the learning goals of AACSB institutions, which is a sign that accredited colleges of business are at least somewhat aligned with the workforce needs of relevant occupations for early career business graduates. However, some broad skills such as active listening, monitoring, coordination, and persuasion are not as commonly represented in typical learning goals. These may be areas where there are opportunities for curricular changes to better equip students with the skills needed to be successful in their future careers. It is also possible that students are already inculcated with these skills and that institutions simply need to find ways to demonstrate their students' mastery of skills. For example, institutions could consider skills badging or certificates associated with particular skills.

In terms of technology skills, the data from job advertisements from 2023 demonstrate that early career business occupations most common in-demand technology skill is the use of spreadsheets and presentation software. These skills show up across the occupational spectrum for common jobs of younger business graduates. For certain types of analyst occupations, other types of software skills are in-demand, including customer relationship management software, SQL, and programing languages for computer system analysts. Although the job advertisement data is collected from a proprietary data source, O*NET provides a publicly available way to observe these in-demand technology skills on an annual basis, by occupation. This information can be particularly useful in ensuring that curriculum is current and relevant, in a rapidly changing business environment.

In terms of future research, there are several avenues worthy of further exploration. First, this paper has exclusively focused on the occupations held and skills required for business majors. It would be useful to conduct a similar analysis of the occupations held by graduates of traditional liberal arts programs, especially in a time of declining enrollment in these programs. A better understanding of the jobs most commonly held by recent graduates of non-business programs and the required skills associated with these jobs would make it possible to add explicit vocational elements to these degrees. As previously mentioned, this will be particularly important given the primary motivation students report for attending institutions of higher education. Second, the recent emergence of new technologies related to artificial intelligence promises to change the workplace in the next few decades. Will firms demand that all college graduates be fluent in the use of these new machine learning technologies, or will these tools be isolated to a handful of programs and related occupations? Artificial intelligence skills do not appear in the most recent data as described in this paper, but stakeholders will want to track the use of these technologies in order to maintain the currency and relevance of their programs. Finally, the focus of this paper was on the skills associated with occupations of relatively recent graduates. One could also conduct a similar analysis for older graduates of business programs, to understand the skill requirements for mid-career workers. This analysis would be particularly useful for institutions offering masters or graduate certificates, to ensure that their offerings are relevant to the labor market needs for their graduates.

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