What Do Employers Expect for Jobs Requiring Media Analytics? A Semantic Network Analysis of Job Descriptions of In-Person and Remote Positions During the COVID-19 Pandemic

Ke Jiang1, Qian Xu1, and Ashleigh Afromsky1

Abstract
Using text mining and semantic network analysis, this study analyzed the job descriptions of 34,787 positions about media analytics from Indeed.com to compare how the in-person and remote jobs differ to inform educators about integrating analytics in the media and communications curriculum. We found that the in-person positions emphasized more on the skills of verbal, interpersonal, and organizational communication, whereas the remote positions asked more for written communication. While the in-person positions had higher expectations of using general data management and analysis tools, the remote positions emphasized more on the use of social media analytics and digital marketing tools.

Keywords
media analytics, remote, in-person, semantic network analysis

Due to media digitization, a large amount of data about media users and how they consume media content have become more accessible (Kapatamoyo, 2019). Media analytics has thus integrated into the functioning of media and communications professions to drive daily decision-making (Hollifield, 2020). It has become an increasingly sought

1Elon University, NC, USA

Corresponding Author:
Ke Jiang, Assistant Professor, School of Communications, Elon University, 50 Campus Drive, Elon, NC 27244, USA.
Email: jenny.jiangke@gmail.com
ability for new college graduates seeking media and communication jobs (Adams & Lee, 2021; Freberg & Kim, 2018). Educators have called attention to integrate media analytics into undergraduate curriculum in media and communications (Neill & Schauster, 2015). However, the lack of clarification on the roles and responsibilities of media analytics makes it challenging for media and communication educators to figure out the industry expectations and prepare undergraduates with relevant skills (Stansberry & MacKenzie, 2020). To address this challenge, this study analyzes the description of job postings with the keyword of media analytics.

Due to the outbreak of the COVID-19 pandemic, many jobs have transitioned to remote work since Spring 2020, which provides us a unique context to compare how the expectations of the in-person and the remote positions about media analytics differ. This remote working trend is said to extend beyond the pandemic at least partially if not to the full extent (Coate, 2021; Parker et al., 2020). Therefore, this study chooses to situate the analysis of job descriptions in the context of COVID-19 to better understand the industry expectations and gain insights into how to prepare our students for both the in-person and remote positions of media analytics. Specifically, this study aims to uncover the differences between the in-person and remote media analytics positions regarding job location, job title, employer type, and how they describe expected skills and required tools through text mining and semantic network analysis.

Analytics and Media Analytics

The term analytics has been used in different ways and in different contexts. While some definitions highlight its quantitative rigor (Cooper, 2012; Daniel, 2015; Tandoc, 2019), others underline its goal-driven nature (Hawkins, 2008; Hollifield, 2020). Following Dinsmore (2016), this study considers analytics as the process of developing useful insights from data for problem-solving. Media analytics focuses on the data about media users and media content (Manovich, 2018). In media and communication industries, analytics includes a wide range of practices, such as general media monitoring, social media listening, evaluation of advertising and marketing effectiveness, assessment of user experience, and distribution forecasting. (Granados, 2019; PwC, n.d.). Despite the differences in purpose, these analytical practices all deal with data about either users or how they consume media and media content. Therefore, this study defines media analytics as the process and practice of gathering and analyzing data about both media users and media content for problem-solving. This problem-solving orientation requires media analytics to go beyond statistical analysis to include the components of asking the right questions, identifying data to answer the questions, gaining actionable insights from data, and effectively presenting insights (Grady, 2020; Hollifield, 2020). With the proliferation of web and social media, more communication positions are particularly looking for employees with media analytics skills to understand the data of user interaction with online and interactive media (Meng et al., 2019).
Data Competence and Analytics in Media and Communication Education

According to a recent study released by the Plank Center for Leadership in Public Relations, communication professionals in North America have identified large gaps between perceived importance and personal qualification level of data, technology, and management competencies, with data as the weakest area of developed competence (Meng et al., 2021). Compared with older professionals, younger professionals were found to be particularly lagging in skills and knowledge about data (Meng et al., 2021). Data competence is critical to media analytics. It addresses the ability to conduct analysis of data about media users and content as well as the knowledge and practices about research methods, data collection, and interpretation of results. Media analytics also require technology competence, which facilitates the learning and use of relevant data tools.

To meet the increasing needs of new hires with data and technology competences, educators in media and communications have called for an integration of analytics at both the program and the course levels (Adams & Lee, 2021). For example, Commission on Public Relations Education (CPRE, 2018) has identified analytics as one of the most important topics for undergraduate public relations curriculum. Accrediting Council on Education in Journalism and Mass Communications (ACEJMC, 2012) has also emphasized the assessment of students’ ability to conduct research and evaluate information with appropriate methods and apply basic numerical and statistical concepts.

However, universities have been slow in integrating analytics into curriculum. O’Boyle and Sturgill (2020) found that most programs of ACEJMC-accredited universities did not offer any analytics-focused course, with only about half offering some courses with analytics components. The programs with a dedicated focus on media analytics are mainly at the graduate level (O’Boyle & Sturgill, 2020). The lack of clarification on the role and responsibilities of media analytics makes it challenging for media and communication educators to figure out how to prepare and integrate analytics into the undergraduate curriculum (Stansberry & MacKenzie, 2020). To help educators understand what is expected from an industry perspective, this study examines the descriptions of jobs requiring media analytics on Indeed.com. It is important to note that the positions requiring media analytics are not just limited to media industries. Other industries provide the relevant positions too. Therefore, in addition to studying the skills and tools described in the job ads, this study also examines the location, the title, and the employer type of these jobs.

Rise of Remote Work During the COVID-19 Pandemic

The outbreak of the COVID-19 pandemic ushered many offices and workplaces to pivot to remote work in spring 2020. By May 2020, more than one-third of employees in United States reported to work from home during the past 4 weeks due to COVID-19 (Coate, 2021). Among them, employees in management, business, and professional
occupations had a higher likelihood to work remotely than others (Coate, 2021). Pew Research Center reported that employees with bachelor’s degree or higher were more likely to report that their work could be done at home than those without a college degree (Parker et al., 2020). Shifting to remote work was also more commonly found for people with more education during the pandemic (Bartik et al., 2020).

Internship, the important career launching pad for college students, has also been significantly influenced by the COVID-19 pandemic. During the peak of the pandemic in 2020, around half of all internship opportunities had been canceled (Martin, 2021), making the demand for internship opportunities far exceed the available positions (Hora et al., 2021). Despite the plunge in overall internship opportunities, remote internships have increased since the start of this pandemic (Feldman, 2021). A recent report from Indeed Hiring Lab showed that the share of all internship postings on its U.S. website dropped 39% compared with the year before the pandemic, while the share of remote internships went up almost seven times in 2020 (Konkel, 2021).

Several of the most common fields with emerging remote jobs and internships, such as marketing, social media, and arts and entertainment (Konkel, 2021; Lusinski & Ward, 2020), are highly relevant to students majoring in media and communications. It is important to understand the similarities and differences between the in-person and the remote positions requiring media analytics. Therefore, this study proposes the following research question.

**RQ1:** What are the differences and similarities between the in-person and the remote positions requiring media analytics regarding (a) location, (b) job title, and (c) employer type?  
By analyzing the expected skills and mastery of tools listed in job ads, this study also informs the development and revision of media and communications curriculum to better prepare students for the new shifts in the job market.  
**RQ2:** What are the differences and similarities between the in-person and remote positions requiring media analytics regarding the skills mentioned in job descriptions?  
**RQ3:** What are the differences and similarities between the in-person and remote positions requiring media analytics regarding the tools mentioned in job descriptions?

**Semantic Networks of Job Descriptions**

Aside from the mentions of skills and tools, this study further compares the differences between in-person and remote positions by analyzing the semantic networks of job descriptions. Semantic network analysis (SMA) is a form of content analysis identifying the network of associations between words expressed in a text (Doerfel, 1998). This method assumes that the text represents a network of words. The position of concepts within a text network thus “provides insight into the meaning or prominent themes of the text as a whole” (Hunter, 2014, p. 350). Its theoretical foundation rests on the cognitive paradigm (D’Angelo, 2002) and the tradition of frame semantics in
linguistics (e.g., Fillmore, 2008). Collins and Quillian (1972) argue that words are hierarchically clustered in memory. Thus, the spatial models illustrating the relations among words are representative of meaning (Barnett & Woelfel, 1988). Through examining the co-occurrence of words in texts, we can identify salient words in specified concept clusters and explain the related framing strategies. SMA has been applied to media and communications scholarship in various areas, such as issue framing (e.g., Jiang et al., 2016), public opinions (e.g., Kwon et al., 2016), and crisis management (e.g., Liu et al., 2018). This study uses SMA to examine and visualize the associations between mentioned skills and tools in job descriptions as well as salient skills or tools in specified concept clusters.

The comparison between the semantic networks of the in-person and the remote positions is conducted through the analyses of Quadratic Assignment Procedure (QAP) correlation, modularity, and centrality. QAP correlation (Borgatti et al., 2002) is a nonparametric technique that does not rely on the assumption of independence. A higher correlation suggests a higher level of similarity in structure between two networks. Modularity analysis addresses how words in a network are clustered into groups (Blondel et al., 2008). It calculates how the mentioned skills and tools are grouped into smaller communities in each semantic network. Together, QAP correlations and modularity analyses help answer the following question about the structural differences in semantic networks.

**RQ4:** How do the semantic networks of the in-person and remote positions differ from each other regarding (a) network structure and (b) number of clusters?

Each word within a semantic network could have different levels of influence on the network, which is measured through normalized eigenvector centrality (Bonacich, 1972; Freeman, 1978). It is important to examine the overall salience of a particular skill or tool mentioned in each cluster of the semantic networks of in-person and remote positions.

**RQ5:** What were the most central skills and/or tools in each cluster of the two semantic networks?

**Method**

Using “media analytics” as the search string, this study identified 34,787 jobs posted on Indeed.com (one of the largest job sites) from May 19, 2020, to January 11, 2021. Among them, more than 25% (n = 7464) were remote positions. The web scraping service parsehub.com was used to collect information about job title, location, employer, and job description. Based on the online database of Dun & Bradstreet (https://www.dnb.com/business-directory/company-search.html), we identified the employer type for the top 100 employers that appeared most frequently.

The text corpus was divided into the in-person and remote positions. The tidytext package for R was used to clean the textual data by removing the stop words that are typically extremely common words in English (e.g., “the,” “of,” “to,” etc.). The most
frequently used phrases identified in job descriptions, such as “marketing strategies” and “social media strategies,” were coded as one concept. Frequency analysis in text mining was used to answer RQ1 to RQ3.

Semantic networks of job descriptions were created based on the bigrams of mentioned skills and tools. QAP correlation, modularity, and normalized eigenvector centrality were calculated to explore the correlation between the two semantic networks and to identify the clusters within each network and the salient skills and/or tools in each cluster (RQ4 and RQ5). The ForceAtlas2 layout in Gephi (Jacomy et al., 2014) was used to create visual maps of semantic networks (Figures 1 and 2) to supplement the discussions of modularity and centrality results.

Results

Top Job Locations, Job Titles, and Employer Types (RQ1)

Both the in-person and remote jobs were mainly from the metropolitan areas with the highest economic outputs, especially along the East and West Coast. Table 1 lists the top 20 cities with the greatest numbers of in-person and remote positions, respectively. Among them, New York City had the most in-person and remote positions. While the
ratios of remote to in-person positions were relatively lower in Charlotte, Seattle, San Francisco, Chicago, and New York City; Washington, D.C., Portland, Los Angeles, Houston, and Nashville had relatively higher ratios of remote to in-person positions.

As shown in Table 2, the top 20 most frequently mentioned job titles of both in-person and remote positions requiring media analytics are related to marketing or social media. Marketing manager, digital marketing specialist, and digital marketing manager emerged as the three most frequently mentioned job titles for both in-person and remote positions. Compared with the in-person positions, the remote positions involved more opportunities for internships.

Among the top 20 employer types offering the greatest number of positions (Table 3), e-commerce employers offered the most in-person positions requiring media analytics, followed by employers in wireless & telecommunications, advertising & marketing services, staffing & recruiting, bank & credit unions, information technology services, pharmaceutical manufacturing, and social media. Employers from advertising & marketing services offered the greatest number of remote positions requiring media analytics, followed by employers in staffing and recruiting, insurance carriers,
agencies and brokerages, information technology services, education and training services, e-commerce, and publishing.

**Most Frequently Mentioned Skills (RQ2)**

To explore how in-person and remote positions requiring media analytics differ regarding expected skills, we identified a total of 89 skills and calculated their mention frequencies respectively. Table 4 lists the top 50 most frequently mentioned skills as well as their percentage of frequency among the 89 identified skills. As shown in Table 4, both in-person and remote positions highly emphasized the skills of communication, writing, research, collaboration, and development of marketing strategies.

Compared with remote positions, the job descriptions of in-person positions had a higher percentage of frequency for the skills about communication and presentation, analytics, marketing plans, project and brand management, programming, customer experience, research, product development, management, business intelligence, digital content, data visualization, and business development. In contrast, the job descriptions of remote positions had a higher percentage of frequency for the skills related to content (e.g., content creation, content strategy, and content marketing), social media (e.g., the platform itself, marketing, management, and strategies, and analytics of...
social media), email marketing and campaigns, marketing strategies, and campaigns in general, collaboration and teamwork, writing, time management, and web development (e.g., HTML and CSS).

**Most Frequently Mentioned Tools (RQ3)**

After identifying 42 tools mentioned in job descriptions, we calculated their mention frequencies by in-person and remote positions. As shown in Table 5, both the in-person and the remote positions emphasized Google Analytics and Facebook the most. Excel and Instagram were the third most frequently mentioned tools for in-person and remote positions, respectively. Compared with remote positions, in-person positions placed more emphasis on the tools for content creation and communication, such as Microsoft Office, PowerPoint, Word, Adobe Creative, and InDesign, as well as for data management and analysis, such as SQL, Tableau, Salesforce, Python, SAS, Adobe Analytics, Nielsen, ComScore, SPSS, and Kenshoo.

In contrast, the job descriptions of remote positions placed more emphasis on the specific online and social media platforms and the relevant tools, such as Facebook, Facebook Page, Facebook Ads, and Facebook Insights, Instagram and Instagram Ads, Google Ads and Google Tag, LinkedIn, YouTube and YouTube Ads, Pinterest, Twitter, Snapchat, and Hootsuite.

---

**Table 2.** Top 20 Most Frequent Job Titles for the Media Analytics Jobs.

| Job title               | F  | Job title                     | F  |
|-------------------------|----|------------------------------|----|
| **In-Person**           |    | **Remote**                   |    |
| 1. Marketing Manager    | 776| Digital Marketing Specialist | 264|
| 2. Digital Marketing Specialist | 736| Marketing Manager            | 242|
| 3. Digital Marketing Manager | 650| Digital Marketing Manager    | 230|
| 4. Marketing Coordinator | 588| Social Media Manager         | 160|
| 5. Marketing Specialist | 403| Marketing Coordinator        | 156|
| 6. Social Media Manager | 396| Social Media Intern          | 104|
| 7. Social Media Specialist | 318| Marketing Specialist        |   95|
| 8. Marketing Assistant  | 245| Social Media Specialist      |   76|
| 9. Marketing Analyst    | 235| Social Media Coordinator     |   75|
| 10. Social Media Coordinator | 221| Marketing Intern             |   71|
| 11. Marketing Director  | 198| Marketing Assistant          |   63|
| 12. Director of Marketing | 190| Marketing Director           |   57|
| 13. Marketing Associate | 167| Digital Marketing Account Manager | 55|
| 14. Digital Marketing Coordinator | 163| Digital Marketing Coordinator | 49|
| 15. Product Marketing Manager | 156| Marketing Associate          |   46|
| 16. Marketing Intern    | 151| Director of Marketing        |   44|
| 17. Digital Marketing Analyst | 118| Content Marketing Manager   |   40|
| 18. Digital Marketing Strategist | 101| Product Marketing Manager   |   40|
| 19. Content Marketing Manager | 95 | Digital Marketing Intern    |   39|
| 20. Email Marketing Specialist | 91 | Social Media Marketing Intern | 39|

Note. F represents the frequency of job titles appeared on the job postings.
Differences in Semantic Networks (RQ4 and RQ5)

QAP Correlation and Network Modularity (RQ4a and 4b)

The QAP correlation result showed that the semantic network structures of in-person and remote positions were similar to each other ($r = .96, p < .001$). The modularity results further confirmed this finding. The modularity scores of the in-person and the remote semantic networks were 0.666 and 0.631 respectively, which indicated dense connections between the skills and the tools within the same clusters and sparse connections between the skills and the tools across different clusters in each semantic network. There were seven clusters in the in-person network and six in the remote one (Table 6).

Most Salient Skill and/or Tool in Each Cluster (RQ5)

Table 7 lists the normalized eigenvector centralities (ranging from 0 to 1, with 1 representing the greatest centrality) and modularity class of each skill and tool in the two semantic networks. For the in-person positions (Figure 1), the largest clusters covered 42.64% of the network and centered around the skill of research closely related to the skills of content creation and collaboration. The second largest cluster (21.71%)
Table 4. Top 50 Most Frequent Skills in Job Descriptions of Media Analytics Positions.

| In-Person | F    | P      | Remote | F    | P      |
|-----------|------|--------|--------|------|--------|
| Communication | 44,015 | 19.51  | Communication | 7566 | 17.02  |
| Writing   | 18,540 | 8.22   | Writing  | 3770 | 8.48   |
| Research  | 14,564 | 6.46   | Research | 2,767 | 6.22   |
| Collaboration | 11,141 | 4.94   | Collaboration | 2,411 | 5.42   |
| Marketing strategies | 7,549  | 3.35   | Marketing strategies | 1,570 | 3.53   |
| Verbal    | 6,346  | 2.81   | Content creation | 1,312 | 2.95   |
| Project management | 6,008  | 2.66   | Verbal  | 1,168 | 2.63   |
| Organizational | 6,001  | 2.66   | Marketing campaigns | 1,147 | 2.58   |
| Marketing campaigns | 5,428  | 2.41   | Organizational | 1,075 | 2.42   |
| Content creation | 5,071  | 2.25   | Email marketing | 1,056 | 2.38   |
| Marketing communication | 4,192  | 1.86   | Project management | 1,021 | 2.30   |
| Interpersonal | 4,083  | 1.81   | Marketing automation | 912   | 2.05   |
| Email marketing | 3,927  | 1.74   | Social media platforms | 825   | 1.86   |
| Presentation | 3,752  | 1.66   | Content marketing | 731   | 1.64   |
| Marketing plans | 3,695  | 1.64   | Social media marketing | 679   | 1.53   |
| Social media platforms | 3,060  | 1.36   | Interpersonal | 619   | 1.39   |
| Marketing experience | 2,666  | 1.18   | Html  | 593   | 1.33   |
| Html      | 2,519  | 1.12   | Presentation | 593   | 1.33   |
| Oral      | 2,471  | 1.10   | Marketing plans | 564   | 1.27   |
| Content marketing | 2,386  | 1.06   | Team player | 516   | 1.16   |
| Team player | 2,369  | 1.05   | Marketing experience | 480   | 1.08   |
| Analytics | 2,360  | 1.05   | Brand awareness | 475   | 1.07   |
| Brand awareness | 2,248  | 1.00   | Marketing channels | 467   | 1.05   |
| Customer experience | 2,156  | 0.96   | Online marketing | 448   | 1.01   |
| Marketing channels | 2,035  | 0.90   | Time management | 435   | 0.98   |
| Time management | 1,998  | 0.89   | Content management | 385   | 0.87   |
| Content management | 1,921  | 0.85   | Email campaigns | 384   | 0.86   |
| Social media marketing | 1,904  | 0.84   | Marketing management | 372   | 0.84   |
| Programming | 1,820  | 0.81   | Content strategy | 371   | 0.83   |
| Marketing communication | 1,784  | 0.79   | CSS  | 360   | 0.81   |
| Business development | 1,759  | 0.78   | Social media accounts | 357   | 0.80   |
| Marketing management | 1,748  | 0.77   | Social media strategies | 352   | 0.79   |
| Social media channels | 1,739  | 0.77   | Oral  | 351   | 0.79   |
| Content strategy | 1,633  | 0.72   | Social media management | 351   | 0.79   |
| Online marketing | 1,614  | 0.72   | Social media channels | 333   | 0.75   |
| CSS       | 1,516  | 0.67   | Business development | 313   | 0.70   |
| Email campaigns | 1,492  | 0.66   | Customer experience | 307   | 0.69   |
| User experience | 1,395  | 0.62   | Advertising campaigns | 297   | 0.67   |
| Digital channels | 1,389  | 0.62   | User experience | 297   | 0.67   |
| Social media strategies | 1,365  | 0.61   | Digital advertising | 293   | 0.66   |
| Digital advertising | 1,308  | 0.58   | Media buying | 290   | 0.65   |
| Digital marketing campaigns | 1,291  | 0.57   | Social media content | 284   | 0.64   |
| Advertising campaigns | 1,288  | 0.57   | Digital marketing campaigns | 267   | 0.60   |
| Management experience | 1,180  | 0.52   | Analytics | 249   | 0.56   |
| Digital content | 1,171  | 0.52   | Digital channels | 240   | 0.54   |
| Product development | 1,171  | 0.52   | Programming | 240   | 0.54   |
| Social media management | 1,163  | 0.52   | Marketing communication | 233   | 0.52   |
| Business intelligence | 1,126  | 0.50   | Social media campaigns | 225   | 0.51   |
| Social media content | 1,112  | 0.49   | Data science | 200   | 0.45   |
| Data science | 1,105  | 0.49   | Strategy development | 197   | 0.44   |

Note. F represents the frequency of mentioned skills for in-person and remote positions. P represents the percentage of frequency among the identified skills (n = 90).
Table 5. Frequency of Mentioned Tools in Job Descriptions of Media Analytics Positions.

| Tool                  | Frequency (In-Person) | Percentage (In-Person) | Tool                  | Frequency (Remote) | Percentage (Remote) |
|-----------------------|-----------------------|-------------------------|-----------------------|-------------------|---------------------|
| Google Analytics      | 7,850                 | 10.81                   | Google Analytics      | 2,254             | 12.91               |
| Facebook              | 7,251                 | 9.99                    | Facebook              | 2,076             | 11.89               |
| Excel                 | 6,906                 | 9.51                    | Instagram             | 1,321             | 7.56                |
| Salesforce            | 4,096                 | 5.64                    | Google Ads            | 1,147             | 6.57                |
| Instagram             | 4,092                 | 5.64                    | Excel                 | 1,109             | 6.35                |
| Twitter               | 3,925                 | 5.41                    | Twitter               | 992               | 5.68                |
| Google Ads            | 3,526                 | 4.86                    | LinkedIn              | 956               | 5.47                |
| PowerPoint            | 3,256                 | 4.48                    | YouTube               | 720               | 4.12                |
| Microsoft Office      | 3,120                 | 4.30                    | Facebook Page         | 659               | 3.77                |
| LinkedIn              | 3,092                 | 4.26                    | Word                  | 575               | 3.29                |
| YouTube               | 2,688                 | 3.70                    | Photoshop             | 498               | 2.85                |
| SQL                   | 2,536                 | 3.49                    | Microsoft Office      | 487               | 2.79                |
| Photoshop             | 2,075                 | 2.86                    | PowerPoint            | 467               | 2.67                |
| Tableau               | 1,943                 | 2.68                    | Pinterest             | 376               | 2.15                |
| Adobe Creative        | 1,671                 | 2.30                    | SQL                   | 357               | 2.04                |
| Pinterest             | 1,328                 | 1.83                    | Facebook Ads          | 322               | 1.84                |
| Illustrator           | 1,123                 | 1.55                    | Adobe Creative        | 319               | 1.83                |
| Python                | 1,058                 | 1.46                    | Illustrator           | 258               | 1.48                |
| InDesign              | 1,022                 | 1.41                    | Tableau               | 239               | 1.37                |
| Facebook Ads          | 903                   | 1.24                    | InDesign              | 204               | 1.17                |
| Adobe Analytics       | 659                   | 0.91                    | Google Tag            | 198               | 1.13                |
| Hootsuite             | 610                   | 0.84                    | Snapchat              | 168               | 0.96                |
| Facebook Page         | 599                   | 0.82                    | Hootsuite             | 160               | 0.92                |
| Snapchat              | 585                   | 0.81                    | Python                | 144               | 0.82                |
| SAS                   | 557                   | 0.77                    | Adobe Analytics       | 95                | 0.54                |
| Google Tag            | 531                   | 0.73                    | Premiere              | 94                | 0.54                |
| Nielsen               | 490                   | 0.67                    | Nielsen               | 60                | 0.34                |
| Premiere              | 375                   | 0.52                    | Facebook Insights     | 53                | 0.30                |
| ComScore              | 222                   | 0.31                    | Sprinklr              | 51                | 0.29                |
| Sprinklr              | 207                   | 0.29                    | Instagram Ads         | 50                | 0.29                |
| Facebook insights     | 154                   | 0.21                    | SAS                   | 37                | 0.21                |
| SPSS                  | 143                   | 0.20                    | Display Network       | 33                | 0.19                |
| Microsoft Suite       | 135                   | 0.19                    | YouTube Ads           | 29                | 0.17                |
| Instagram Ads         | 132                   | 0.18                    | Twitter Ads           | 24                | 0.14                |
| Kenshoo               | 123                   | 0.17                    | Microsoft Suite       | 20                | 0.11                |
| Display Network       | 99                    | 0.14                    | Brandwatch            | 17                | 0.10                |
| Twitter Ads           | 81                    | 0.11                    | Twitter Analytics     | 17                | 0.10                |
| Twitter Analytics     | 66                    | 0.09                    | Kenshoo               | 11                | 0.06                |
| Brandwatch            | 47                    | 0.06                    | SPSS                  | 11                | 0.06                |
| Sysomos               | 21                    | 0.03                    | ComScore              | 8                 | 0.05                |
| YouTube Ads           | 14                    | 0.02                    | Sysomos               | 3                 | 0.02                |

Note. F represents the frequency of mentioned tools for in-person and remote positions. P represents the percentage of frequency among the identified tools (n = 42).
centered around the tool Google Analytics closely tied to a variety of digital advertising and marketing tools, such as Google Ads, Facebook Ads, Twitter Ads, and Salesforce. Communication was the hub of the third largest cluster (10.85%), which was closely associated with skills of writing, verbal, oral, interpersonal, and organizational communication as well as presentation. Facebook was the hub of another third largest cluster (10.85%), which was closely tied to other specific social media platforms, such as Instagram, Twitter, LinkedIn, YouTube, and Pinterest. This social media cluster was also closely connected to the skills in managing social media channels, accounts, and pages, as well as increasing social media presence across diverse platforms. Excel was the hub of the fifth largest cluster (6.2%) and was strongly associated with the tools of Word, PowerPoint, and Microsoft Office. The sixth largest cluster centered around the skill of HTML (4.65%), which was closely tied to the skills about CSS, basic HTML, and HTML coding. Photoshop was the hub of the smallest cluster (1%) and was strongly tied to InDesign, Illustrator, and Premiere.

For the remote positions, the largest clusters took 36.44% of the network and centered around Google Analytics. Different from the in-person job descriptions, this cluster of tools about digital advertising was also strongly associated with skills about marketing automation, email marketing, social media marketing, social media management, and social media analytics. The second largest cluster (34.75%) centered around the skill of research which was closely tied to the skills of marketing strategies, web development, as well as writing. Different from the in-person network, there was not any salient cluster with the skill of communication as a hub. The skill of communication co-occurred most frequently with writing, a salient node in the research cluster, and was strongly associated with the skill of content creation. Similar to the in-person network, Facebook was also the hub of the third largest cluster (11.86%) and closely tied to a set of social media tools and skills. The fourth largest cluster (8.47%) centered around the tool of SQL, clustering with the tools of HTML, CSS, SAS, SPSS, Python, and programming skill. Compared with the in-person network, the remote

| Table 6. QAP Correlation and Modularity Analysis Results. |
|-------------------------------|------------------|------------------|
| In-Person                     | Remote           | QAP: 0.96        |
| Modularity                    | .666             | Modularity       | .631             |
| Clusters P (%) Hub            | Clusters P (%) Hub |
| Red 42.64 Research            | Red 36.44 Google Analytics |
| Blue 21.71 Google Analytics   | Blue 34.75 Research |
| Green 10.85 Communication     | Green 11.86 Facebook |
| Purple 10.85 Facebook         | Purple 8.47 SQL |
| Orange 6.20 Excel             | Orange 5.08 Excel |
| LBlue 4.65 HTML               | LBlue 3.39 Photoshop |
| LGreen 1 Photoshop            |                  |

Note. P represents the percentage of each cluster in the semantic network. Hub represents the most salient skills or tool in each cluster in terms of eigenvector centrality. LBlue = Light Blue; LGreen = Light Green; QAP = quadratic assignment procedure.
Table 7. Eigenvector Centralities and Modularity Class of Nodes in the Two Semantic Networks.

| In-Person     | Eigen  | Cluster | Remote       | Eigen   | Cluster |
|---------------|--------|---------|--------------|---------|---------|
| Google Analytics | 1.000  | Blue    | Google Analytics | 1.000  | Red     |
| Communication | 0.955  | Green   | Facebook     | 0.817   | Green   |
| Research      | 0.859  | Red     | Research     | 0.814   | Blue    |
| Email Marketing | 0.854  | Red     | Google Ads   | 0.666   | Red     |
| Writing       | 0.793  | Green   | Email marketing | 0.653  | Red     |
| Project management | 0.783  | Green   | Writing      | 0.646   | Blue    |
| Google Ads    | 0.757  | Blue    | LinkedIn     | 0.587   | Green   |
| Content creation | 0.731  | Red     | Communication | 0.538   | Blue    |
| Facebook      | 0.670  | Purple  | Content creation | 0.533  | Blue    |
| Email Marketing | 0.649  | Red     | Twitter      | 0.525   | Green   |
| Social media platforms | 0.595  | Purple  | Social media platforms | 0.509  | Green   |
| Salesforce    | 0.583  | Blue    | Instagram    | 0.484   | Green   |
| LinkedIn      | 0.579  | Purple  | Salesforce   | 0.450   | Red     |
| YouTube       | 0.571  | Purple  | YouTube      | 0.434   | Green   |
| Collaboration | 0.560  | Red     | Project management | 0.433  | Blue    |
| Excel         | 0.552  | Orange  | Social media management | 0.416  | Red     |
| Digital advertising | 0.536  | Red     | Facebook Ads | 0.406   | Red     |
| Social media management | 0.519  | Red     | Excel        | 0.401   | Orange  |
| Content marketing | 0.516  | Red     | Marketing strategies | 0.400  | Red     |
| PowerPoint    | 0.499  | Orange  | Hootsuite    | 0.395   | Red     |
| Twitter       | 0.496  | Purple  | Social media marketing | 0.382  | Red     |
| Email campaigns | 0.483  | Red     | Marketing automation | 0.377  | Red     |
| Social media channels | 0.479  | Purple  | Microsoft Office | 0.369  | Orange  |
| HTML          | 0.475  | LBlue   | Marketing campaigns | 0.360  | Blue    |
| Microsoft Office | 0.470  | Orange  | Word         | 0.344   | Orange  |
| Content management | 0.465  | Red     | Content marketing | 0.330  | Red     |
| Marketing campaigns | 0.455  | Red     | Pinterest    | 0.319   | Green   |
| Hootsuite     | 0.444  | Blue    | Content management | 0.311  | Red     |
| Instagram     | 0.439  | Purple  | Snapchat     | 0.297   | Green   |
| Campaign management | 0.426  | Red     | Presentation | 0.272   | Blue    |
| Marketing strategies | 0.418  | Red     | PowerPoint    | 0.266   | Orange  |
| Photoshop     | 0.417  | LGreen  | Photoshop    | 0.264   | LBlue   |
| Content strategy | 0.416  | Red     | Tableau      | 0.264   | Red     |
| Social media campaigns | 0.397  | Red     | Collaboration | 0.261   | Blue    |
| Programming   | 0.395  | Blue    | Content strategy | 0.258  | Red     |
| Social media marketing | 0.375  | Red     | Social media channels | 0.257  | Green   |
| Word          | 0.373  | Orange  | Web development | 0.249   | Blue    |
| Web development | 0.373  | LBlue   | SQL          | 0.248   | Purple  |
| Organizational | 0.371  | Green   | YouTube Ads  | 0.247   | Red     |
| Presentation  | 0.358  | Green   | HTML         | 0.245   | Purple  |
| Pinterest     | 0.354  | Purple  | Advertising campaigns | 0.234  | Red     |
| SQL           | 0.348  | Blue    | Team player  | 0.228   | Blue    |
| Adobe Analytics | 0.346  | Blue    | Adobe Analytics | 0.225  | Red     |
| Advertising campaigns | 0.344  | Red     | InDesign     | 0.222   | LBlue   |
| Tableau       | 0.339  | Blue    | Online marketing | 0.222  | Red     |
| Facebook Ads  | 0.330  | Blue    | Organizational | 0.217   | Blue    |
| Analytics     | 0.321  | Green   | Instagram Ads | 0.211   | Red     |
| Marketing experience | 0.311  | Red     | Email campaigns | 0.200   | Blue    |
| Media buying  | 0.296  | Red     | Campaign management | 0.192  | Red     |
| Strategy development | 0.294  | Red     | Marketing communication | 0.182  | Blue    |
| Data management | 0.292  | Red     | Media buying  | 0.182   | Green   |
| InDesign      | 0.285  | LGreen  | Marketing management | 0.181   | Blue    |
Table 7. (continued)

| In-Person            | Eigen | Cluster  | Remote            | Eigen | Cluster |
|----------------------|-------|----------|-------------------|-------|---------|
| Social media strategies | 0.284 | Red      | Illustrator       | 0.180 | LBlue   |
| Paid social media    | 0.280 | Red      | Social media content | 0.178 | Blue    |
| Social media accounts | 0.279 | Purple   | Data science      | 0.176 | Blue    |
| Marketing communication | 0.277 | Red      | Interpersonal     | 0.173 | Blue    |
| Team player          | 0.272 | Red      | Social media accounts | 0.168 | Green   |
| Business development | 0.271 | Red      | Paid social media | 0.168 | Red     |
| Adobe Creative       | 0.262 | Orange   | Data analytic     | 0.168 | Blue    |
| Brand management     | 0.260 | Red      | Twitter Ads       | 0.168 | Red     |
| Digital content      | 0.259 | Green    | Email marketing campaigns | 0.164 | Red     |
| CSS                  | 0.257 | LBlue    | Time management   | 0.155 | Blue    |
| Customer experience  | 0.256 | Red      | Analytics         | 0.154 | Blue    |
| Marketing plans      | 0.256 | Red      | Basic html        | 0.154 | Purple  |
| Verbal               | 0.255 | Green    | Business development | 0.153 | Blue    |
| Web content          | 0.253 | Red      | Digital advertising | 0.152 | Red     |
| Business intelligence | 0.249 | Red      | Adobe Creative    | 0.148 | Orange  |
| Online marketing     | 0.241 | Red      | Programming       | 0.145 | Purple  |
| Basic html           | 0.238 | LBlue    | Social media presence | 0.143 | Green   |
| User experience      | 0.238 | Red      | CSS               | 0.137 | Purple  |
| Marketing management | 0.235 | Red      | Google Tag        | 0.134 | Red     |
| Brand awareness      | 0.234 | Red      | Sprinklr          | 0.132 | Red     |
| Email marketing campaigns | 0.231 | Red      | Verbal            | 0.131 | Blue    |
| Digital channels     | 0.229 | Red      | Data visualization | 0.130 | Red     |
| Social media content | 0.228 | Red      | Oral              | 0.130 | Blue    |
| Data visualization   | 0.228 | Blue     | User experience   | 0.128 | Blue    |
| Marketing channels   | 0.221 | LBlue    | Social media posts | 0.120 | Blue    |
| Social media analytics | 0.220 | Red      | Data driven       | 0.117 | Blue    |
| Data driven          | 0.214 | Red      | Digital marketing campaigns | 0.111 | Red     |
| Oral                 | 0.212 | Green    | Python            | 0.111 | Purple  |
| Digital marketing experience | 0.211 | Red      | Marketing channels | 0.110 | Blue    |
| Google Tag           | 0.206 | Blue     | Web content       | 0.110 | Blue    |
| Illustrator          | 0.205 | LGreen   | Display network   | 0.110 | Red     |
| Digital marketing campaigns | 0.202 | Red      | Digital content   | 0.110 | Blue    |
| Time management      | 0.202 | Green    | Social media analytics | 0.109 | Red     |
| Interpersonal        | 0.200 | Green    | Social media campaigns | 0.104 | Green   |
| Data science         | 0.200 | Red      | Strategy development | 0.104 | Blue    |
| SAS                  | 0.197 | Blue     | Kenshoo           | 0.100 | Red     |
| Python               | 0.197 | Blue     | Campaign development | 0.098 | Red     |
| Snapchat             | 0.197 | Purple   | Digital channels  | 0.097 | Blue    |
| Campaign development | 0.194 | Red      | Integrated marketing | 0.092 | Blue    |
| Social media posts   | 0.190 | Green    | Nielsen           | 0.091 | Red     |
| Management experience | 0.184 | Blue     | Customer experience | 0.091 | Blue    |
| Social listening     | 0.179 | Red      | Facebook Insights | 0.090 | Red     |
| Sprinklr             | 0.176 | Blue     | Brand management  | 0.085 | Blue    |
| Facebook Insights    | 0.172 | Blue     | Social listening  | 0.085 | Red     |
| ComScore             | 0.170 | Blue     | Business intelligence | 0.080 | Blue    |
| Data mining          | 0.162 | Blue     | Facebook Page     | 0.077 | Green   |
| Display Network      | 0.161 | Blue     | Microsoft Suite   | 0.075 | Orange  |
| Data analytic        | 0.148 | Red      | marketing plans   | 0.071 | Blue    |

Note. Red is the color of the largest cluster. Blue is the color of the second-largest cluster. Green is the color of the third largest cluster. Purple is the color of the fourth largest cluster. Orange is the color of the fifth largest cluster. LBlue represents Light Blue that is the color of the sixth largest cluster. LGreen represents Light Green that is the color of smallest cluster.
network also had a relatively smaller Microsoft Office cluster (5.08%) and a larger Adobe Creative Suite cluster (3.39%).

Discussion

Through text mining and semantic network analysis, this study compared the in-person and remote jobs requiring media analytics to inform educators about integrating analytics in the media and communications curriculum. The findings indicate that both the in-person and remote positions emphasized the competencies of conducting research, developing strategies, communication, and collaborations as well as the mastery of the tools about data analysis, digital marketing, and content creation. These expectations are consistent with the CPRE’s (2018) and ACEJMC’s (2012) emphasis on integrating research, analysis, and data into media and communications curriculum. However, these expectations also suggest that knowledge and skills about data and analytics are rarely sought alone. Instead, employers expect the candidates to apply them in conjunction with other media and communication domain-specific knowledge to drive strategy development and decision-making, which is rooted in the original definition of analytics (Dinsmore, 2016).

Similar to the earlier research by Stansberry and MacKenzie (2020), communication emerged as a top skill desired by both types of positions. However, the nature of the working mode influenced which aspect of communication they emphasized on (Coate, 2021). Specifically, the in-person positions emphasized more on verbal, interpersonal, and organizational communication, whereas the remote positions asked more for written communication. In addition, while the in-person positions had higher expectations on the general data management and analysis tools, the remote positions underlined the use of analysis and advertising tools related to specific social media platforms and search engines.

Informed by these findings, the programs in media and communications should consider incorporating the following topics into the curriculum to prepare students for positions requiring media analytics. First, considering the high mention frequency of Excel in the descriptions of in-person positions, the use of spreadsheets should be integrated into the existing curriculum to lay the foundation for managing large datasets and creating effective visualizations for reporting. For example, Excel labs can be integrated into writing classes to introduce how to match various types of audience datasets with appropriate visualizations for creating business and research reports. As called by ACEJMC (2012), students need to be equipped with the knowledge of basic statistics and metrics for describing the audience’s interaction with traditional and emerging media. More importantly, the most salient skills that distinguish communication students from computer and data science students are storytelling, presentation, and collaboration. Group work should be provided to allow students to collaboratively analyze the user data. Plenty of oral presentation opportunities are needed for students to practice using data visualizations to communicate insights and better manage brands.
The COVID-19 pandemic not only increased the share of remote internships as reported by Indeed Hiring Lab (Konkel, 2021) but also led to more remote internship opportunities in digital and social media management and marketing, which are highly relevant to college students majoring in media and communications. To get them prepared with essential analytical skills for this kind of internship, we need to teach analytics beyond the spreadsheets and integrate more hands-on activities about social listening using both popular free platforms, such as Facebook Ads & Insights, Instagram Ads & Insights, Twitter Ads & Analytics, and YouTube Ads & Insights, as well as paid analytics platforms, such as Brandwatch. It is even more helpful to dedicate some courses to social listening and social media content creation. Furthermore, students need to be equipped with the ability to use Google Analytics to track and understand media users’ digital footprints on a variety of social media platforms, employing data to gauge audience engagement (e.g., acquisition and conversion), and developing/optimizing social media marketing and campaign strategies. For example, students could work on a project to first conduct market research through social listening, develop a social media marketing plan and/or campaign through content creation, and then use Google Tags and Google Analytics to track and assess the effectiveness of the plan.

Aside from informing curriculum development, the findings of this study also shed light on some actions to be taken by student professional development centers (SPDCs) to better prepare students for careers requiring media analytics. For example, SPDCs could use the keywords and key phrases of skills and tools identified in this study (listed in Tables 4 and 5) to help students better understand the employers’ expectations. By using the target keywords and key phrases recognized by employers, students will be able to build effective resumes and develop coherent personal narratives to demonstrate their knowledge and skills about media analytics in interviews. Media analytics is a fast-growing field. Expanding students’ connection with employers will allow them to obtain update-to-date know-hows from the field.

There are several limitations to this study. First, although text mining and semantic network analysis allow us to examine a large number of job ads, it is limited to quantitative analysis of keywords and key phrases. Future research could integrate qualitative analysis to gain a more nuanced understanding of the industry expectations. Second, the data were collected during the first and second waves of the COVID-19 pandemic in the United States when most companies were functioning in the remote mode. Future research could expand the data collection period to compare the in-person and remote positions at different time points, such as before, during, and post the pandemic, or at different waves. This comparative research could further enrich the findings discovered in this study.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.
Funding
The author(s) received no financial support for the research, authorship, and/or publication of this article.

References
Accrediting Council on Education in Journalism and Mass Communications. (2012). A guide to assessment of learning outcomes for ACEJMC accreditation. http://www.acejmc.org/wp-content/uploads/2016/08/ACEJMC-Guide-to-Assessment-of-Learning-Outcomes.pdf
Adams, M. B., & Lee, N. M. (2021). Analytics in PR education: Desired skills for digital communicators. Journal of Public Relations Education, 7(2), 203–212. https://ajejmc.us/jpre/2021/09/10/analytics-in-pr-education-desired-skills-for-digital-communicators/
Barnett, G. A., & Woelfel, J. (Eds.). (1988). Readings in the Galileo system: Theory, methods and applications. Kendall/Hunt.
Bartik, A., Cullen, Z., Glaeser, E., Luca, M., & Stanton, C. (2020). What jobs are being done at home during the COVID-19 crisis? Evidence from firm-level surveys (NBER Working Paper No. 27422). National Bureau of Economic Research. https://www.nber.org/system/files/working_papers/w27422/w27422.pdf
Blondel, V. D., Guillaume, J. L., Lambiotte, R., & Lefebvre, E. (2008). Fast unfolding of communities in large networks. Journal of Statistical Mechanics, 10, P10008. https://doi.org/10.1088/1742-5468/2008/10/P10008
Bonacich, P. (1972). Factoring and weighting approaches to status scores and clique identification. Journal of Mathematical Sociology, 2(1), 113–120. https://doi.org/10.1080/0022250X.1972.9989806
Borgatti, S., Everett, M., & Freeman, L. C. (2002). UCINET: Network analysis software [Computer software]. Analytic Technologies.
Coate, P. (2021, January 25). Remote work before, during, and after the pandemic. Quarterly Economics Briefing, Q4. https://www.ncci.com/SecureDocuments/QEB/QEB_Q4_2020_RemoteWork.html
Collins, A. M., & Quillian, M. R. (1972). Experiments on semantic memory and language comprehension. In L. W. Gregg (Ed.), Cognition in learning and memory (pp. 117–138). Wiley.
Commission on Public Relations Education. (2018). Fast forward: Foundations + future state. Educators + practitioners: The Commission on Public Relations Education 2017 report on undergraduate education. http://www.commissionpred.org/wp-content/uploads/2018/04/report6-full.pdf
Cooper, A. (2012). What is “analytics”? Definition and essential characteristics. CETIS Analytics Series, 1(5), 1–10. https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.2 58.5595&rep=rep1&type=pdf
D’Angelo, P. (2002). News framing as a multiparadigmatic research program: A response to Entman. Journal of Communication, 52(4), 870–888. https://doi.org/10.1111/j.1460-2466.2002.tb02578.x
Daniel, B. K. (2015). Big data and analytics in higher education: Opportunities and challenges. British Journal of Educational Technology, 46, 904–920. https://doi.org/10.1111/bjet.12230
Dinsmore, T. W. (2016). Disruptive analytics: Charting your strategy for next-generation business analytics. Apress.
Doerfel, M. L. (1998). What constitutes semantic network analysis? A comparison of research and methodologies. Connections, 21(2), 16–26.
Feldman, E. (2021). Virtual internships during the COVID-19 pandemic and beyond. *New Horizons in Adult Education and Human Resource Development, 33*(2), 45–51. https://doi.org/10.1002/nha3.20314

Fillmore, C. J. (2008). Frame semantics. In D. Geeraerts (Ed.), *Cognitive linguistics: Basic readings* (pp. 373–400). De Gruyter.

Freberg, K., & Kim, C. M. (2018). Social media education: Industry leader recommendations for curriculum and faculty competencies. *Journalism & Mass Communication Educator, 73*(4), 379–391. https://doi.org/10.1177/1077695817725414

Freeman, L. C. (1978). Centrality in social networks conceptual clarification. *Social Networks, 1*(3), 215–239.

Grady, D. A. (2020). Media analytics and audiences. In D. A. Grady, C. A. Hollifield & A. Sturgill (Eds.), *The golden age of data: Media analytics in study and practice* (pp. 3–17). Routledge.

Granados, N. (2019, December 9). Vision 2020: How analytics will transform media and entertainment in the next decade. *Forbes*. https://www.forbes.com/sites/nelsongranados/2019/12/09/vision-2020-how-analytics-will-transform-media-and-entertainment-in-the-next-decade/?sh=387cd4126a6

Hawkins, B. L. (2008). Accountability, demands for information, and the role of the campus IT organization. In R. N. Katz (Ed.), *The tower and the cloud* (pp. 98–104). EDUCAUSE.

Hollifield, C. A. (2020). The pioneers of media analytics in higher education. In D. A. Grady, C. A. Hollifield & A. Sturgill (Eds.), *The golden age of data: Media analytics in study and practice* (pp. 31–40). Routledge.

Hora, M. T., Lee, C., Chen, Z., & Hernandez, A. (2021). Exploring online internships amidst the COVID-19 pandemic in 2020: Results from a mixed-methods study. Center for Research on College-Workforce Transitions, University of Wisconsin–Madison.

Hunter, S. (2014). A novel method of network text analysis. *Open Journal of Modern Linguistics, 4*(2), 350–366.

Jacomy, M., Venturini, T., Heymann, S., & Bastian, M. (2014). ForceAtlas2, a continuous graph layout algorithm for handy network visualization designed for the Gephi software. *PLOS ONE, 9*(6), Article e98679. https://doi.org/10.1371/journal.pone.0098679

Jiang, K., Barnett, G. A., & Taylor, L. D. (2016). News framing in an international context: A semantic network analysis. *International Journal of Communication, 10*, 3710–3736.

Kapatamoyo, M. (2019). Data analytics in mass communication: New methods for an old craft. *Iberian Journal of Information Systems and Technologies, 20*, 504–515.

Konkel, A. (2021, April 27). Remote internships jump during pandemic. Indeed Hiring Lab. https://www.hiringlab.org/2021/04/27/remote-internships-jump-during-pandemic/

Kwon, K. H., Bang, C. C., Égnato, M., & Raghav Rao, H. (2016). Social media rumors as improvised public opinion: Semantic network analyses of twitter discourses during Korean saber rattling 2013. *Asian Journal of Communication, 26*(3), 201–222. https://doi.org/10.1080/01292986.2015.1130157

Liu, W., Lai, C. H., & Xu, W. W. (2018). Tweeting about emergency: A semantic network analysis of government organizations’ social media messaging during hurricane Harvey. *Public Relations Review, 44*(5), 807–819. https://doi.org/10.1016/j.pubrev.2018.10.009

Lusinski, N., & Ward, M. (2020, April 21). The 13 most common work-from-home jobs in America, and how much money you can make doing them. *Business Insider*. https://www.businessinsider.com/jobs-work-from-home-2019-3
Manovich, L. (2018). 100 billion data rows per second: Media analytics in the early 21st century. *International Journal of Communication, 12*, 473–488. https://ijoc.org/index.php/ijoc/article/view/6160/2249

Martin, A. (2021, August 26). The pandemic made internships hypercompetitive. *CNBC*. https://www.cnbc.com/2021/08/26/the-pandemic-made-internships-hypercompetitive.html

Meng, J., Jin, Y., Lee, Y.-I., & Kim, S. (2019). Can Google Analytics certification cultivate PR students’ competency in digital analytics? A longitudinal pedagogical research. *Journalism & Mass Communication Educator, 74*(4), 388–406. https://doi.org/10.1177/1077695818816916

Meng, J., Reber, B. H., Berger, B. K., Gower, K. K., & Zerfass, A. (2021). *North American Communication Monitor 2020-2021. The impact of COVID-19 pandemic, ethical challenges, gender issues, cyber security, and competence gaps in strategic communication*. The Plank Center for Leadership in Public Relations. http://plankcenter.ua.edu/wp-content/uploads/2021/06/NACM-Report-2020-21-1.pdf

Neill, M. S., & Schauster, E. (2015). Gaps in advertising and public relations education: Perspectives of agency leaders. *Journal of Advertising Education, 19*(2), 5–17. https://doi.org/10.1177/109804821501900203

O’Boyle, J., & Sturgill, A. (2020). Prevalence of media analytics content in accredited colleges and universities. In D. A. Grady, C. A. Hollifield & A. Sturgill (Eds.), *The golden age of data: Media analytics in study and practice* (pp. 137–145). Routledge.

Parker, K., Horowitz, J. M., & Minkin, R. (2020, December 9). How the coronavirus outbreak has—and hasn’t—changed the way Americans work. *Pew Research Center*. https://www.pewresearch.org/social-trends/2020/12/09/how-the-coronavirus-outbreak-has-and-hasnt-changed-the-way-americans-work/

PwC. (n.d.). *Data and analytics in the entertainment and media sector*. https://www.pwc.co.uk/issues/data-analytics/industries/data-and-analytics-in-the-entertainment-and-media-sector.html

Stansberry, K., & MacKenzie, M. (2020). Equipping the media analytics toolbox: A study of the skills required for entry and mid-level media analytics jobs. In D. A. Grady, C. A. Hollifield & A. Sturgill (Eds.), *The golden age of data: Media analytics in study and practice* (pp. 56–69). Routledge.

Tandoc, E. C. Jr. (2019). *Analyzing analytics: Disrupting journalism one click at a time*. Routledge.

**Author Biographies**

**Ke Jiang** (Ph.D.) is an assistant professor of media analytics in the School of Communications at Elon University. She is a computational social scientist in the areas of network analysis, natural language processing, and social media analytics. Her research interests focus on the media effects on the macro-society level, as well as the evolution of digital culture and humanity.

**Qian Xu** (Ph.D.) is a professor of strategic communications in the School of Communications at Elon University. She teaches courses on media analytics and strategies for interactive media and social media. Her research interests focus on the social and psychological effects of media technology, as well as the pedagogy of high impact practices.

**Ashleigh Afromsky** is a recent graduate from Elon University with bachelor degrees in Media Analytics and Communication Design.