Identifying Industry-Relevant Digital Marketing Competencies Using Text Mining of Job Postings

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One of the ways synergies between higher education and industry can exist is through embedded partnerships, which requires higher educational programs to prepare learners with appropriate industry-relevant competencies and skills. This research focuses on identifying such competencies using text mining of job postings. A sample of 77 job postings from Washington State were analyzed using text mining, revealing critical competencies, skills, tools, and techniques in the digital marketing field, which has implications for maintaining relevancy and currency of digital marketing programs. In addition, an emergent synergistic framework is proposed to translate job attributes to higher education program characteristics.

Keywords: marketing, digital marketing, text mining, natural language processing, hiring attributes, competencies attributes, framework

INTRODUCTION

Since decades, higher education programs have strived to prepare learners with competencies relevant to the workforce. Indeed, higher education serves as a talent supplier and the industry as a talent receiver, forming a synergistic relationship through specific industry-relevant competencies. However, in recent years, there has been increasing concern among industry and higher education stakeholders that educational programs are failing to adequately prepare learners for the rapidly evolving demands of the workforce (Holzner, 2017; Monis, 2018; Niu et al., 2019). These concerns are heightened in rapidly evolving fields such as digital marketing, which is the focus of our paper. For example, recent research by the Digital Marketing Institute reveals that around 58% of marketers acknowledge their roles are evolving due to emerging technologies like Artificial Intelligence (AI). This report highlights a significant skill gap in the digital marketing field, not just at the undergraduate level but across all levels of marketing education (MacRae, 2024). This skill gap occurs when a significant deviation (or significant lack of synergy) exists between industry requirements and digital marketing program offerings. In fact, the Association to Advance

Collegiate Schools of Business (AACSB) in its report, "A New Vision for Business Education," identified this gap and called for business education programs to be more open and foster partnerships with industries and communities to prepare learners for a rapidly changing workplace (Gonela and Khoja, 2023).

Traditional methods such as industry panels, focus groups, and questionnaire surveys are often used to identify current and critical industry-relevant competencies so that the program curriculum is designed, restructured, or improved to enhance learning and to align with the job market. However, these methods pose trade-offs and challenges regarding resource-intensiveness, time consumption, and subjectivity. For example, suppose feedback on industry competency requirements is obtained from a smaller number of stakeholders. In that case, it is less resource-intensive and time-consuming, however, identifying appropriate competencies becomes prone to subjectivity and/or personal biases. Similarly, if feedback on industry competency requirements is obtained from a larger number of stakeholders, it becomes resource-intensive and time-consuming; though, identifying appropriate competencies is highly objective. However, in the latter case, despite the high level of objectivity, competencies could become outdated in rapidly evolving fields, if the time taken is significantly longer.

With the recent advancement of computational capabilities and AI, text mining, especially using Natural Language Processing (NLP), offers a faster, more resource-efficient way to objectively identify key competencies from workforce job listings. A literature review indicates that several higher education programs have used text mining to identify competencies (Chung & Chen, 2021; McLaughlin, Lupton-Smith, & Wolcott, 2018). However, very few studies have been conducted in the marketing field. In fact, Spada et al. (2022) is the only study that used text mining to compare the competency gaps between industry and marketing program's course offerings. However, this study has multiple gaps. These include: (1) not all job attributes are identified. The study identifies only competency attributes and falls short in identifying hiring attributes that have implications for marketing program characteristics, and (2) the study merely compares the gaps between labor market competencies and marketing program's competency offerings but does not provide insights into how the industry competency requirements can be translated to program characteristics such that learners are career ready. This paper addresses these gaps in literature within the context of the digital marketing field. Specifically, the unique contribution of this paper is as follows:

1. We propose a holistic methodology that involves identifying job attributes and translating these attributes to higher education program characteristics.
2. The generic methodology uses a combination of manual coding and natural language processing (NLP) to identify competency attributes as well as hiring attributes of job posting. The combination of competency and hiring attributes have significant implications for higher education program offerings.
3. Based on our findings, we propose a unique emergent synergistic framework that translates job attributes to program characteristics.

LITERATURE AND CONTRIBUTION

A comprehensive literature review identifies several studies that focus on industry-relevant competencies and their implications for higher education programs. For example, Azevedo et al. (2012) developed a two-step conceptual framework to determine the appropriate competencies for business graduates. In the first step, the authors analyzed academic literature and semi-structured interviews to determine a holistic set of competencies. Based on this holistic set of competencies, a survey of 900 graduates was performed to identify important generic and business education-related competencies. Parera et al. (2017) adopted a three-phase data gathering framework that included literature review, expert forum, and survey of both industry and academia to identify the mandatory, core, and optional competencies for construction graduates. The study identifies different competencies and highlights significant perception gaps between academia and industry in competency levels of graduating learners. Further, to address the gap between employers' expectations and the actual competency profile of graduating learners in the engineering field, Daineko et al. (2020) analyzed and compared legislative frameworks with competency profiles of a university in Russia and found that project-based learning with emphasis on use of online

technology is important for industry-relevant competency development among learners. Celerta and Esponilla (2021) conducted a questionnaire survey to understand necessary competencies and their relevance to the job market. The results indicate that *theoretical knowledge, practical skills, communication, research, and interpersonal skills* are the most important competencies for success in industrial education. Poláková et al. (2023) further validated this, who developed a multi-step framework that included literature review and job postings to identify important labor competencies under Industry 5.0. The results indicate that *analytical thinking, problem-solving, communication skills, and creativity with flexibility* are the most important competencies. Van Berkum et al. (2024) developed a two-step methodology to determine important competencies for graduates and professionals in a food technology program. The first step of the two-step methodology involved faculty determining a holistic set of competencies through literature review. The second step involved surveying graduates and professionals on the holistic set, resulting in identifying *analytical thinking, critical thinking, problem solving, and decision-making* as important competencies for the food technology program. Kipper et al. (2021) performed scientific mapping of academic literature to identify qualifications of professionals working in Industry 4.0. They identified both core competencies (such as *leadership, strategic vision, problem solving* etc.) and contemporary field competencies (such as *algorithm, automation, software* etc.) to be important for success in the Industry 4.0 workforce.

As discussed above, much research has been conducted on identifying competencies with implications for higher education program offerings. Nevertheless, very few studies have been conducted in the marketing area. Walker et al. (2009) conducted an in-depth interview of a small sample of graduates and employers. They identified *application of marketing skills, numeracy, computer, written communication, oral communication, interpersonal skills, teamwork, problem solving, comprehension of business processes, management, accounting and finance, business ethics, and personal skills* to be the most important skills for success in the marketing workforce. More recently, Comai (2025) investigated the digital marketing capabilities sought by higher education institutions through coding and grouping analysis of 255 job advertisements across North America, Europe, and Asia-Pacific. The study identified 79 specific capabilities grouped into six themes: market, results, management, media, stakeholders, and learning. Using the dynamic capabilities framework, it was revealed that 56 of these capabilities are not addressed in existing literature. Findings suggested that digital marketing needs are consistent across regions and experience levels, emphasizing the importance of standardization and continuous adaptation. This research provided a framework for curriculum development, staff recruitment, and capability assessment in higher education digital marketing practices.

Importantly, most research on competencies rely on methods such as surveys, interviews, and focus groups. A handful of emerging work across various areas are starting to use methods such as text mining, especially content analysis using Natural Language Processing (NLP) to identify competencies. For example, McLaughlin et al. (2018) performed text mining of 80 job postings to identify important competencies in the pharmaceutical industry. Chung and Chen (2021) performed text mining of job advertisements for Human Resource (HR) professionals to understand capabilities required by HR professionals to be successful in the job market. Verma et al. (2022) performed content analysis of AI and Machine Learning (ML) positions and found that while skills like data mining, programming, statistics, and big data are more valued in ML than AI, generic skills such as communication are more valued in AI than ML.

Within the marketing field, Spada et al. (2022) is the only study that used text mining to compare competency gaps between labor market job postings and marketing exam descriptions at universities. Their study indicates that labor market competency requirements are significantly higher than what is covered in the marketing program offerings. However, this study has multiple gaps. These include: (1) This study identifies only competency attributes and falls short of identifying hiring attributes that have implications for digital marketing program characteristics, and (2) The study merely compares gaps between labor market competencies and marketing program's competency offerings but does not provide insights into how industry competency requirements translate to program characteristics to enhance career readiness of learners.

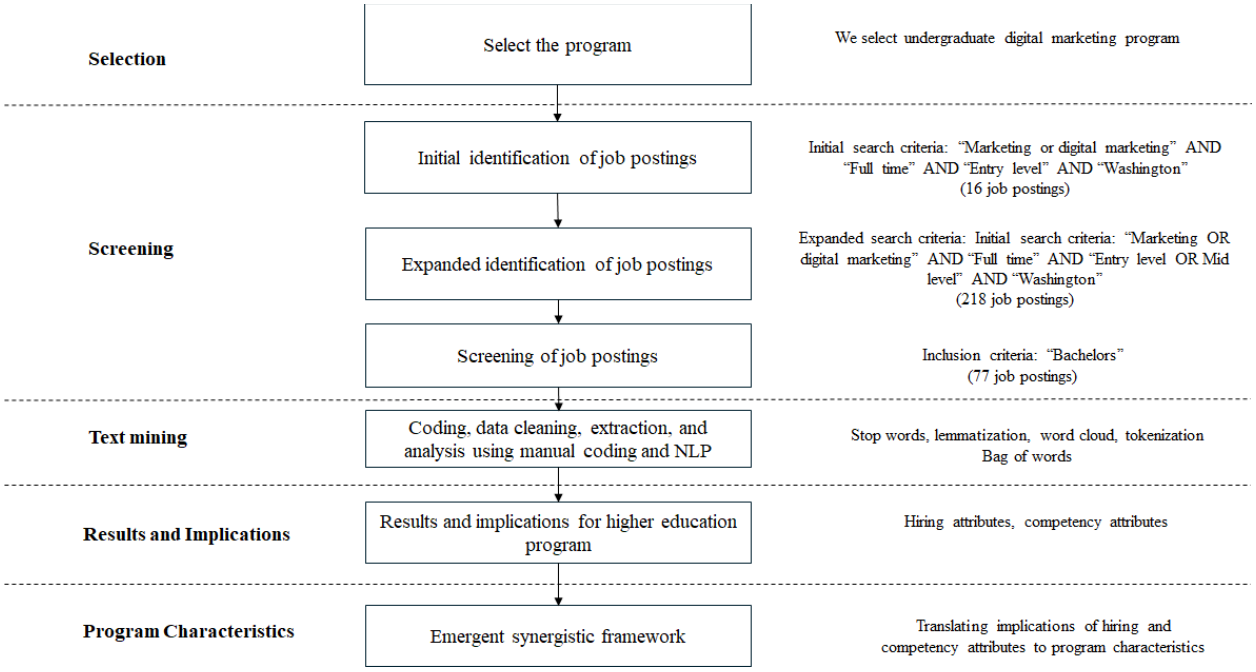
Our paper addresses these literature gaps within the specific context of the digital marketing field. We use a holistic methodology combining manual coding with NLP to analyze 77 job postings. Our holistic methodology and analysis identify both competencies and hiring attributes with implications for translating them into digital marketing program characteristics.

METHODOLOGY

Our proposed holistic methodology is shown in Figure 1, which consists of five important phases: (1) selection of higher education program; (2) screening of job postings; (3) text mining of job postings; (4) results and their implications; and (5) transforming job attributes to program characteristics.

As mentioned, we focus on digital marketing programs to apply the proposed holistic methodology. Therefore, our first phase which involves selecting the program will be the "*undergraduate digital marketing program*". The second phase of the proposed methodology involves searching and screening job postings which may involve single to multiple screenings depending on the sample size obtained. In our case, we searched for jobs through Indeed.com between November 11, 2024, to November 17, 2024. Our initial search criteria involved entry-level full-time jobs in the marketing or digital marketing area in the state of Washington by using the search criteria: "Marketing OR Digital Marketing" AND "Full time" AND "Entry level" AND "Washington", with logical operands "AND" and "OR" yielding 16 job postings. The rationale behind including both *marketing* and *digital marketing* in search criteria is that undergraduate digital marketing programs typically involve both marketing and digital marketing course offerings. The reason for including both *entry-level* and *full-time* positions is because graduating undergraduate students typically transition into these entry-level positions. *Washington State* was chosen since the study is conducted for digital marketing for a regional university in Washington. However, the study can include broader spatial and temporal data. Since the number of job postings identified from the initial screening yielded low number of job postings, we decided to expand our search criteria that included both *entry-level* and *mid-level* jobs by using the expanded search criteria: "Marketing OR Digital Marketing" AND "Full time" AND "Entry level OR Mid-level" AND "Washington" yielding 218 job postings. Since the jobs were targeted for undergraduate learners that are in bachelor's degree or seeking job after graduation, a screening of jobs is performed to limit to only those jobs that requires bachelor's degree by adding inclusion criteria "Bachelors" to the expanded search criteria with an operand "AND" resulting in obtaining 77 job postings. In the third phase, these 77 jobs are initially coded manually into Excel to include: (1) modality; (2) company; (3) job title; (4) qualification; (5) experience; (6) location; (7) salary; and (8) job requirements. The coded Excel document can be provided to the readers at request. In the second step of the third phase, the data is transferred to google collab to perform data cleaning, analysis, and extraction using Python language. Numerous NLP techniques that include *stop words* to remove common words, *lemmatization* to remove various forms of words, *tokenization* to split words into small tokens, *Bag of words* that focus on frequency of words, and *clustering analysis* are used to extract key data components. It is important to highlight that wherever necessary manual analysis is also performed. In the fourth phase that involved results and implications, text mining results are classified into hiring and competency attributes and implications relevant to digital marketing programs are provided. In the final phase, an emergent synergistic framework that transforms job attributes to program characteristics is developed such that these characteristics are embedded into the program to enhance the career-readiness of learners.

FIGURE 1
PROPOSED HOLISTIC METHODOLOGY TO IDENTIFY JOB ATTRIBUTES AND TRANSFORM THEM INTO PROGRAM CHARACTERISTICS



RESULTS AND IMPLICATIONS FOR DIGITAL MARKETING PROGRAMS

This section presents the results of the text mining analysis and their relevance to a higher education digital marketing program. The text mining results are classified into two categories: (1) hiring attributes; and (2) competency attributes.

Hiring Attributes

In this section, we primarily focus on three important marketing-related hiring attributes that include: (1) experience requirements; (2) modality requirements; and (3) discipline requirements.

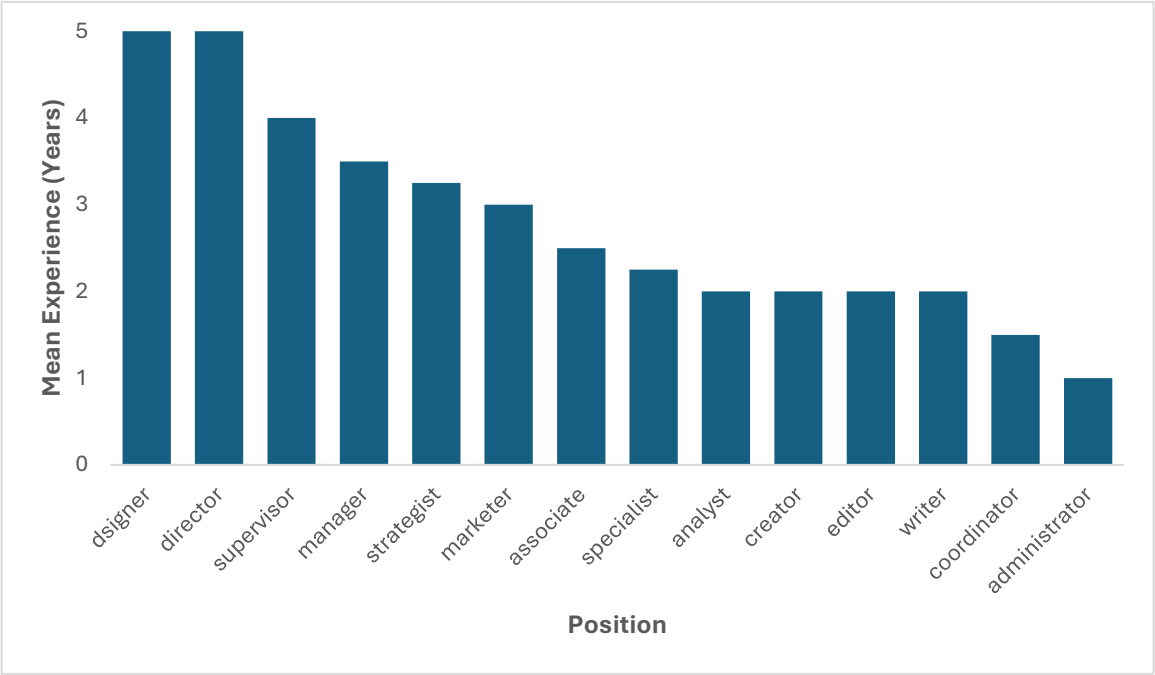
Experience Requirements

This attribute aims to understand the average experience required for different positions in the digital marketing industry. Figure 2 presents the average experience required by position type. It indicates that digital marketing graduates typically enter the workforce with operational marketing positions such as administrator, coordinator, writer, etc. and get promoted to strategic marketing positions such as manager, supervisor, director, designer etc. over time.

A comparative analysis performed between entry-level and mid-level indicates that on average, an entry-level position requires 1.19 years of experience, and a mid-level job requires 2.78 years of experience. This highlights that recent graduates in the digital marketing area may face challenges in securing employment since there is a practical experience requirement even for entry level jobs. Therefore, digital marketing programs in higher education need to integrate high impact experiential learning practices such as *service learning, consulting, community-based learning, project-based learning, student-led digital marketing initiatives, portfolio building, internships, micro-internships, and targeting skills* such that learners are already trained with competencies required for operational marketing positions. In addition, digital marketing programs can consider offering stackable curriculum with micro-credentials and certifications across the curriculum. This allows students to obtain credentials such as badges and

certifications early in the program, thereby allowing learners to build their resumes early. These badges can enhance employability (in parallel while in school) and equip students with essential skills that can be applied in advanced courses or internships. Furthermore, our analysis indicates that even though the search criteria included bachelor's degree, approximately 16% of the jobs indicated requiring associates or equivalent experience. Our analysis also indicates that even though it is challenging for digital marketing graduates to obtain entry-level positions, once obtained they can be promoted to strategic positions relatively quickly.

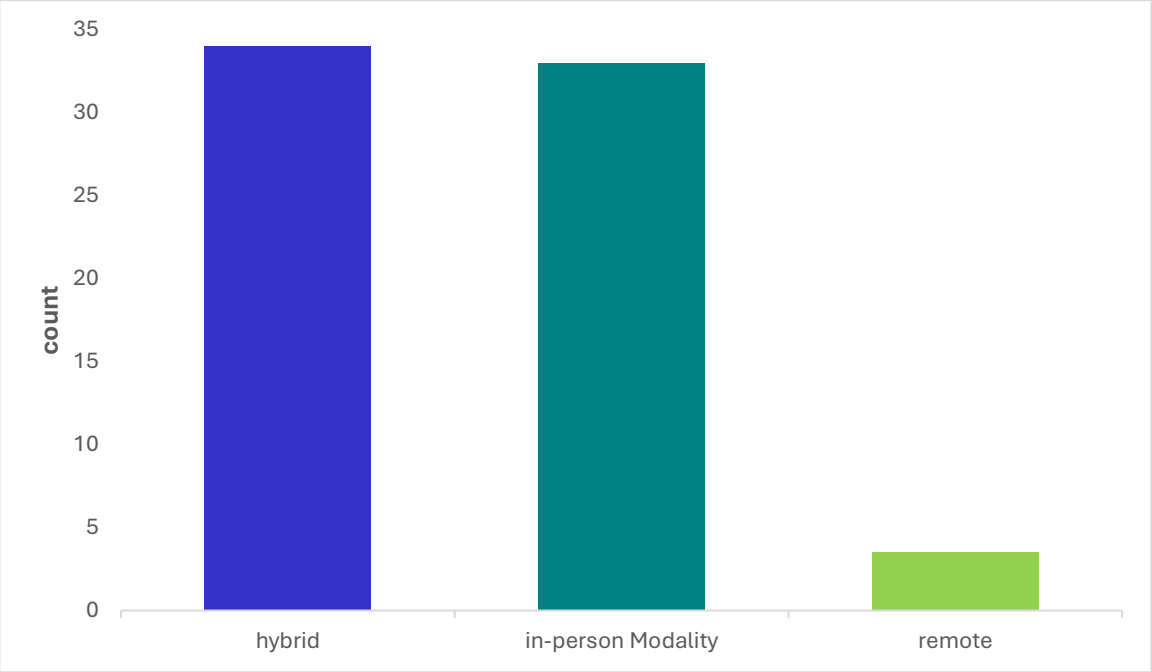
FIGURE 2
AVERAGE EXPERIENCE REQUIRED BY POSITION



Modality Requirements

Figure 3 implies that digital marketing graduates should be ideally cross-trained to work across multiple modalities, including remote, in-person, or hybrid (a combination of in-person and remote). Consequently, digital marketing programs must encourage learners to go through different modalities to adapt to different work requirements. This allows students to obtain technological skills such as using Microsoft Teams, Zoom, and netiquette, apart from face-to-face professional skills. In addition, digital marketing programs must facilitate learners to come out of their comfort zones concerning modalities to be more adaptable.

FIGURE 3
JOB MODALITIES



Discipline Requirements

A word cloud analysis was conducted to understand the disciplines listed in job postings (see Figure 4). It indicates that several ancillary disciplines are associated with digital marketing roles. This indicates that digital marketing programs should collaborate with such disciplines to develop varying interdisciplinary or multidisciplinary program configurations such as degree, certificate, and micro-credentials, allowing learners to be agile to diverse job requirements. The word cloud analysis showed that marketing strongly correlated with Communication and Journalism; a moderate correlation with English, Psychology, Graphic design, and Media/public relations, and a weaker correlation with Management, Economics, Accounting, Math, and Computer science. These findings emphasize the opportunity for allowing students to upskill and broaden their horizons while looking for jobs. This also points to implications for collaborating across programs for digital marketing program design considerations. For example, students can be cross-trained in disciplines that show strong correlations, while digital marketing certificates or micro-credentials could be helpful for disciplines that have moderate to weak correlations in the word cloud data.

FIGURE 4
DISCIPLINES LISTED IN JOB POSTINGS

Competency Attributes

Competency attributes uncovered from text mining of job postings are related to: (1) human centric skills and competencies, (2) marketing-related skills and competencies, (3) tools, technologies, and platforms used, and (4) blooms taxonomy verbs used are identified and their relevancy to a digital marketing program is discussed.

Human-Centric Skills and Competencies

Table 1 shows the human-centric skills and competencies classified as: (1) basic competencies and (2) emerging competencies. Basic competencies are the essential competencies, and learners should have mastered by the time of graduation. Therefore, these competencies can be treated as required competencies and if proficient do not impact job opportunities for learners. However, if not proficient, learners may fail to obtain jobs (Gonela and Khoja, 2023). Emerging competencies are those that are new to the job market and may be treated as recommended competencies and if not proficient do not impact job opportunities. However, if proficient, it will result in high probability of placement in jobs (Gonela and Khoja, 2023). The competencies identified in Table 1 can help program faculty determine both programs learning outcomes (PLOs) as well as course learning outcomes (CLOs) within a digital marketing program. Currently, digital marketing programs are typically in business schools and the curriculum consists of business core courses, marketing core courses, and digital marketing courses. The basic competencies in Table 1 can be used to determine the program learning outcomes for business curriculum as these are the core learning competencies for the business programs in which learners must demonstrate proficiency. Therefore, these competencies should be embedded across the business curriculum such that learners become highly proficient. While program faculty are free to select any type and number of basic competencies to be embedded in business curriculum, Table 1 indicates that written communication, verbal communication, technological proficiency, teamwork, and analytical skills are the top five competencies that are required of

digital marketing graduates. Therefore, a digital marketing program can have these competencies as PLOs for business core curriculum such that these competencies are introduced, practiced, and reinforced several times for learners throughout the program to achieve mastery.

For emerging competencies, program faculty can consider embedding them into program through course learning outcomes or elective courses, thereby introducing learners to these competencies. Since these competencies are recommended, program faculty can choose to achieve any level of proficiency, where some of the competencies can only be introduced, some can be introduced and practiced and some can be introduced, practiced, and reinforced depending on the willingness of the program faculty. In fact, some of the human-centric competencies can be directly embedded through individual core general or business courses such as project management, negotiation, and organization behavior.

TABLE 1
HUMAN-CENTRIC COMPETENCIES IDENTIFIED FROM JOB POSTINGS

Basic competencies	Job postings (%)	Emerging competencies	Job postings
Writing	66%	Cross-functional	9%
Verbal	55%	Strategic thinking	8%
Tech proficiency	51%	Decision making	7%
Teamwork	46%	Leadership	7%
Analytical	37%	Creative thinking	5%
Project management	30%	Continuous learning and self-development	4%
Time management	30%	Cross-cultural	3%
Organizational skills	22%	Management	3%
Multi-task	21%	Organizational change	3%
Problem solving	21%	Organizational management	3%
Work independently	18%	Personal management	3%
Interpersonal skills	17%	Research	3%
Adaptability	14%	Team management	3%
Financial literacy	13%	Business acumen	1%
Prioritization	12%	Negotiation	1%
		Resource Management	1%
		Solution-oriented	1%
		Stakeholder Management	1%

Marketing-Related Skills and Competencies

In our analysis, a total of 96 distinct skills and competencies are identified from job postings. These are categorized into 30 different clusters using cluster analysis. Out of these 30 different clusters, we classify as: (1) basic marketing-related clusters in which basic skills and competencies related to a cluster are grouped together; and (2) emerging marketing-related clusters in which emerging skills and competencies related to the cluster are grouped. Table 2 presents the basic marketing-related clusters, which suggests that platform-, campaigns-, tools-, marketing-, management-, optimization-, and strategies-related skills and competencies are required to be successful in digital marketing jobs. Table 3 presents the emerging marketing-related clusters, which indicates that automation-, software-, techniques-, and technological-related skills and competencies are emerging clusters that can distinguish job seekers in digital marketing industry. The percentages in both Tables 2 and 3 represent the percentage of job postings that indicated a particular cluster.

From a digital marketing programmatic perspective, since basic clusters are required, program faculty can embed different basic clusters into marketing and digital marketing core curriculum as program learning outcomes.

As for the emerging clusters, since they are recommended competencies, these can be embedded into marketing or digital marketing elective course. Furthermore, since most clusters require direct practical knowledge and applications such as platforms, campaigns, tools, automation, software etc., digital marketing curriculum must be practice-oriented and include a capstone course project bringing the competency areas together.

TABLE 2
BASIC MARKETING-RELATED CLUSTERS UNCOVERED FROM JOB POSTINGS

Platform (36%)	Campaigns (30%)	Tools (30%)
Analytics	Advertising	Advertising
Digital advertising	Demand generation	Analytics
Digital Marketing	Digital	Optimization
eCommerce	Digital marketing	Customer relationship management
Email marketing	Display	Data visualization
Marketing	Email	Digital marketing
Marketing automation	Marketing	Email marketing
Marketing technology	Media	Marketing analytics
Omnichannel	Paid Media	Marketing automation
Paid advertising	Pay-for-click	Marketing
Paid Media campaign	Social media	Paid social media competitive analysis
Social		Social media analytics
Social media		Social media management
Social media Management		Social media management
Website		Website content management
Marketing (24%)	**Management (21%)**	**Optimization (20%)**
Digital	Campaign	Digital campaign
Email	Client	Quantitative media analysis
Integrated	Content	Search engine
Lifecycle	Customer relationship	Search
Search Engine	Event	
Social media	Relationship	
	Social media	
	Website content	
Strategies (13%)		
Digital marketing		
Marketing		
Retail Marketing		
Search engine optimization		
Social media marketing		

TABLE 3
EMERGING MARKETING-RELATED CLUSTERS UNCOVERED FROM JOB POSTINGS

Automation (4%)	Software (4%)	Techniques (4%)	Technologies (4%)
Marketing	Graphic design Marketing	Conversion rate optimization Marketing Optimization	Digital marketing Marketing

Tools, Technologies, and Platforms

A total of 95 unique tools, technologies, and platforms were identified. However, Table 4 focuses on those referenced in more than 3% of the postings. The basic tools, technologies, and platforms include Adobe Creative Suite, Google Analytics, Excel, Microsoft Office Suite, and HubSpot, which are widely used in the digital marketing field and therefore, digital marketing program faculty can consider embedding these competencies into marketing and digital marketing core curriculum. As for the emerging tools, technologies, and platforms the most prevalent are Adobe Premium Pro, Asana, CSS, SEMRush, AHREFs into elective courses. The diversity of tools, technologies, and platforms in digital marketing emphasizes the importance of a project-based or practice-based curriculum. In fact, most of the courses should include real-world projects connected directly to industry such that learners simultaneously gain theoretical knowledge and practical experience through their curriculum.

TABLE 4
TOOLS, TECHNOLOGIES, AND PLATFORMS IDENTIFIED FROM JOB POSTINGS

Basic	Job postings (%)	Emerging	Job postings (%)
Adobe Creative	24%	Adobe Premium Pro	4%
Google Analytics	21%	Asana	4%
Excel	20%	CSS	4%
Microsoft Office Suite	14%	SEMRush	4%
HubSpot	13%	AHREFs	3%
Word	12%	Facebook Ads Manager	3%
Facebook	11%	Marketo	3%
Google Ads	11%	Pinterest	3%
Instagram	11%	Shopify	3%
TikTok	9%	Snapchat	3%
Canva	8%	Tableau	3%
LinkedIn	8%	Wrike	3%
Photoshop	8%	X	3%
Illustrator	7%		
InDesign	7%		
YouTube	7%		
HTML	5%		
Meta	5%		
PowerPoint	5%		
Salesforce	5%		
WordPress	5%		

Blooms Taxonomy Verbs

Table 5 presents the verbs associated with the cognitive domain of Blooms taxonomy and highlights important verbs along with the percentage of times a particular verb has been used in the job postings. Overall, Blooms taxonomy verbs have been used 161 times in the 77 jobs considered for this study. Table 5 indicates that job postings are highly dominated by application, analysis, and synthesis verbs, indicating that the digital marketing field values practical experience and knowledge. Therefore, digital marketing programs in higher education must target a practice-based curriculum.

TABLE 5
BLOOMS TAXONOMY VERBS USED IN JOB POSTINGS

Cognitive domain	Important verbs	Frequency (%)
Knowledge (13%)	Meet	5%
	Write	4%
	Identify	3%
Comprehension (9%)	Interpret	4%
	Understand	3%
Application (31%)	Utilize	4%
	Demonstrate	3%
	Handle	3%
	Maintain	3%
Analysis (19%)	Analyze	4%
	Monitor	3%
	Optimize	3%
	Prioritize	3%
Synthesis (19%)	Collaborate	4%
	Develop	3%
	Improve	3%
	Organize	3%
Evaluation (8%)	Assess	4%

EMERGENT SYNERGISTIC FRAMEWORK

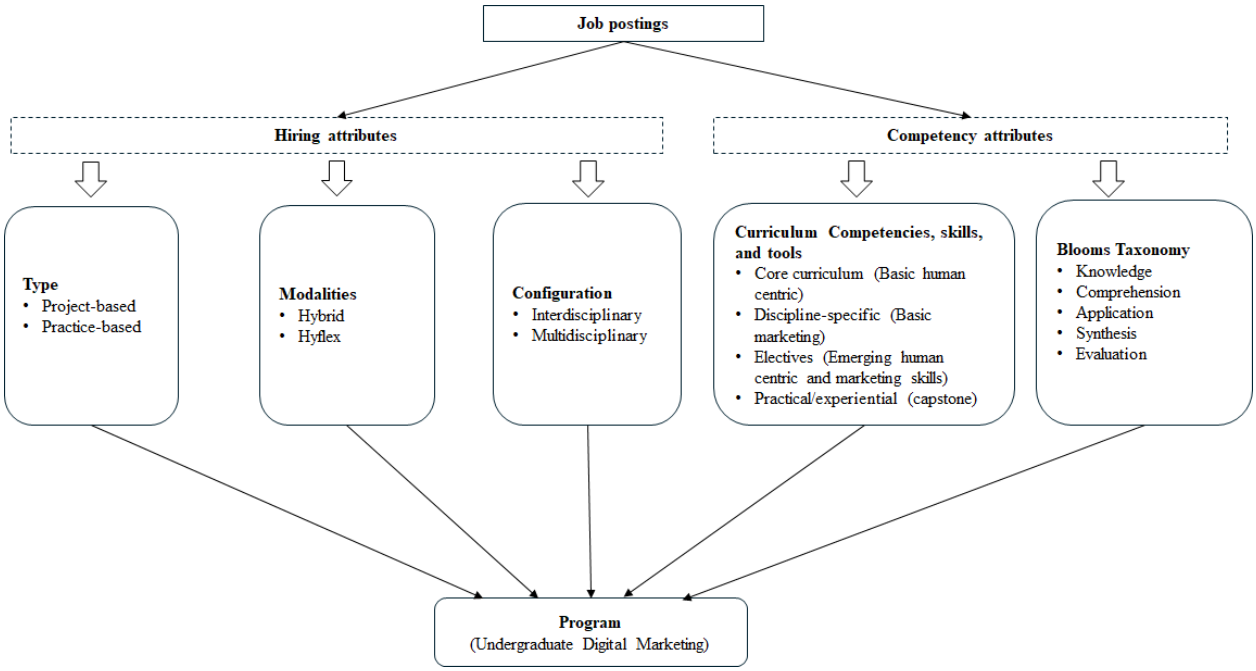
Our text mining analysis has implications for higher education program characteristics. Figure 5 shows the emergent synergistic framework for digital marketing programs that transform digital marketing job attributes (both hiring and competency) to program characteristics, which will eventually help in digital marketing program development, restructuring, and improvement. Our text mining results on digital marketing area suggest that five elements of program (program characteristics) can be identified through job postings and their attributes. These elements include:

1. Type: Program type refers to how educational programs are structured, especially regarding learning approach, delivery, and objectives.
2. Modality: program modalities refer to the mode of delivery or how students engage with the learning experience. These modalities influence when, where, and how learning occurs.
3. Configuration: program configurations refer to how a program is structured regarding its content focus, breadth, and disciplinary scope. These configurations affect what students learn and how broadly or narrowly their expertise is defined.
4. Curriculum competencies, skills, and tools: This refers to which components of the curriculum the competencies, skills, and tools can be embedded.
5. Blooms taxonomy: This refers to the hierarchical levels that represent different kinds of cognitive learning, from basic to higher-order thinking levels.

Figure 5 shows the emergent synergistic framework that helps translate hiring attributes and competencies identified in our analysis into program design considerations. Hiring attributes can identify the type, modality, configuration and competency attributes can determine the curriculum competencies, skills, tools, and hierarchical levels of learning outcomes (through Blooms taxonomy).

To explain the framework for our case of an undergraduate digital marketing program, our study indicates that the digital marketing program should be both practice- and project-based in hybrid or hyflex modality with interdisciplinary or multidisciplinary configuration. In terms of curriculum competencies basic human-centric competencies can be embedded in core business curriculum and basic marketing competencies can be embedded in required discipline-specific core curriculum. In addition, emerging competencies can be embedded in core electives and discipline-specific electives. Furthermore, digital marketing-related competencies, skills, and tools can be integrated through practical/experiential capstone projects. In terms of hierarchical level of learning outcomes, competency attributes indicate that application, synthesis, and analysis are important cognitive domains for digital marketing learning, indicating that wherever necessary real project or practice needs are important to address across the curriculum.

FIGURE 5
AN EMERGENT SYNERGISTIC FRAMEWORK TO TRANSFORM JOB ATTRIBUTES TO PROGRAM CHARACTERISTICS



CONCLUSIONS

The synergy between higher education programs and industry requirements occurs when industry competency requirements are embedded in higher education programs. However, in recent years, a significant gap has been observed in learners' capabilities to meet competency requirements of industry, especially in rapidly evolving areas such as digital marketing. Therefore, this research identifies industry-relevant hiring attributes and competencies to translate them into program characteristics. This ensures that learners are adequately prepared for evolving industry requirements. A sample of 77 job postings from Washington State, USA are analyzed through text mining involving manual coding and Natural Language Processing (NLP).

Results indicate that digital marketing programs should have the following characteristics such that learners are career ready at graduation: First, based on our findings, learners require a minimum of one year experience for entry level positions. Moreover, the analysis of Bloom's taxonomy verbs indicates that application, analysis, and synthesis aspects of Blooms taxonomy are important, and these emphasize the need for practice-based curriculum in digital marketing. Thus, Digital marketing programs should offer practice-based curriculum by integrating several high-impact experiential learning activities such as service learning, consulting projects, project-based learning, micro-internships, and full internships. Programs can also consider offering stackable micro-credentials and certifications leading to a degree. This approach will provide badges and certificates to learners in the initial stages of the program, allowing them to seek digital marketing opportunities while in school.

Second, our results suggest that cross-training learners across multiple disciplines and modalities would enable them to be adaptable to any modality of work, including in-person, hybrid, and remote positions. Extending this further, digital marketing programs can consider developing full-fledged interdisciplinary programs with Communication and Journalism disciplines, given their high correlation with digital marketing (as evident in our word cloud analysis). Similarly, digital marketing programs can consider offering certificate programs to learners in English, Psychology, Graphic design, and Media/public relations disciplines such that they can upskill and broaden their job opportunities. Programs can also consider offering micro credentials in Management, Economics, Accounting, Mathematics, and Computer science disciplines allowing learners to explore new avenues that complement digital marketing skills.

Third, Business programs should consider adding digital marketing courses to their general or business core curriculum. This provides opportunities to offer basic or required competencies such as written communication, verbal communication, tech proficiency, teamwork, and analytical skills. Emerging recommended competencies such cross-functional, strategic thinking, decision making, leadership, and creative thinking through business or general electives are also important. Marketing-related skills and competencies can be clustered into several groups, including platform-, campaigns-, tools-, marketing-, management-, optimization-, and strategies. These skills and competencies- could be implemented into the marketing or digital marketing curriculum through project-based learning. Similarly, competencies and skills related to emerging clusters such as automation-, software-, techniques-, and technological-related skills and competencies can be offered through marketing or digital marketing electives. This could encompass required tools, techniques, and platforms such as Adobe Creation, Google Analytics, Excel, Microsoft Office, and Hubspot which could be offered in the core curriculum. Recommended tools such as Adobe Premium Pro, Asana, CSS, SEMRush, AHREFs can be offered through marketing elective courses. These clusters can be integrated through a capstone project or course.

Finally, our proposed emergent framework indicates that text mining of digital marketing job postings can help determine the program type, modality, configuration, curriculum competency, skills, tools and hierarchical level of thinking (Bloom's taxonomy) elements of a program.

Even though the study offers several insights, future research can further validate the results of our study by using traditional methods such as questionnaire surveys, focus group studies, and industry panel feedback before embedding into the program. In addition, the study is conducted for a regional university; thus, it is spatially bound. Future research can expand text mining jobs across the nation and globally to establish prevalent competencies in the digital marketing area. Interestingly, even though AI competencies such as analytics, pricing, automation, and optimization are specified in job postings, prominent Artificial Intelligence (AI) competencies related to Large Language LLMs, or Generative AI used for content creation, are not explicitly specified. This is perhaps because corporate adoption of AI is not yet formally embedded in job roles outside technical fields such as engineering. Future research can examine whether AI literacy is highlighted as a competency in future job postings. Similarly, a comparative analysis over time on the evolving ratio of human versus technical skills in the age of AI and their implications for programmatic design could be an interesting extension of our research.

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