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Research Article

Decoding Employer Demands: Reshaping Core Competencies of Fashion Graduates through Labor Market Analysis

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Abstract

The digital transformation of the global fashion industry has reshaped the skill requirements of the labor market. A significant skills mismatch exists between the talent cultivation programs of higher education institutions and the realities of the actual employment market. This study aims to decode the core competency requirements of fashion industry employers through empirical data. The research adopts a content analysis methodology integrated with data mining techniques. By collecting 119 job advertisements from 13 representative apparel enterprises, the study conducted quantitative mining on 1,596 valid textual records. Data processing utilized Term Frequency-Inverse Document Frequency (TF-IDF) indexing and Latent Dirichlet Allocation (LDA) topic modeling. The analytical results indicate that enterprise demand for talent has shifted from singular professional skills toward interdisciplinary talent equipped with cross-functional proficiencies and digital acumen. High-weight feature words corroborate those digital capabilities, such as live-streaming and new media operations, have become core technical barriers within the industry. The topic model extracted two core dimensions: core job responsibilities and business operations, alongside professional skills and role competencies. Furthermore, the semantic network structure reveals that employers' recruitment criteria are highly oriented toward practical experience and results-driven outcomes. This study proposes that higher education institutions should deeply embed cutting-edge digital technologies into professional curricula and vigorously promote work-based learning (WBL) systems. The findings provide objective data support for narrowing the industry-education supply-demand gap and reconfiguring interdisciplinary talent cultivation paradigms.

Keywords

fashion education, core competencies, skills mismatch, content analysis, text mining

1. Introduction

The global fashion industry is currently navigating a period of profound transformation propelled by Industry 4.0. Digital transformation has comprehensively permeated every node of the design, production, and supply chain processes (Glogar et al., 2025). Technologies such as digital twins, artificial intelligence (AI), and the Internet of Things (IoT) have emerged as the core driving forces catalyzing industrial upgrading (Huang et al., 2021; Glogar et al., 2025). This paradigm shift in the technological environment has precipitated a fundamental inflection point in the labor market's skill requirements for practitioners. Traditional apparel manufacturing and design logics are transitioning toward digitally driven paradigms (Roberts & Bailey, 2025). Employers no longer focus exclusively on singular technical proficiencies; instead, enterprises demonstrate a heightened demand for hybrid talent equipped with interdisciplinary competencies and agile responsiveness (Leiby, 2021). This shifting demand requires practitioners to effectively bridge creative expression with technical implementation. Consequently, re-evaluating the competency requirements of the labor market has become an imperative for sustained industrial development.

Despite the rapid iterations within the industrial technological environment, the talent cultivation programs of higher education institutions exhibit pronounced lag (Kohli, 2024). Existing curricular frameworks struggle to meet the practical standards of digitalized workspaces and intelligent manufacturing (Roberts & Bailey, 2025). A significant skills mismatch persists between the competencies possessed by graduates and the authentic demands of the labor market (Alshameri & Adhikari, 2025). This disconnect manifests not only at the level of specialized technical skills but is further exacerbated by contextual discrepancies in competency descriptions between the educational system and the corporate sector (Babich & Ivashchenkova, 2024). Numerous higher education programs remain entrenched in traditional pedagogical paradigms, failing to effectively respond to rapid techno-economic transformations and generally lacking deep linkages with authentic occupational environments and employer demands (Esaqzi et al., 2025). This information asymmetry results in a pervasive blindness regarding talent cultivation objectives. There is an urgent imperative to identify and delineate these skill gaps through empirical data.

Content analysis serves as an effective methodological instrument for identifying the evolution of skill demands within specialized domains (Messum et al., 2017). Compared to traditional expert interviews, text mining based on large-scale job advertisements can more objectively elucidate the dynamic fluctuations of market demands (Sagitov, 2024). This study aims to decode the core competency requirements of employers by analyzing recruitment

market data within the fashion industry. The research constructs a data-driven competency matrix by extracting key information from job descriptions. These quantified results will directly delineate the current industry's prioritization of both hard and soft skills. The findings will not only expose the deficiencies within the current educational system but also provide robust empirical support for higher education institutions to restructure their talent cultivation syllabi (Piróg & Hibszer, 2023). By optimizing curriculum structures and instructional content, higher education can more accurately elevate the core competitiveness of graduates and attenuate the supply-demand gap between academia and industry.

2. Literature Review

2.1. The Evolution of Core Competencies in the Fashion Industry

The global fashion industry is currently situated at a pivotal juncture of a technological paradigm shift. The convergent application of Industry 4.0-related technologies has not only optimized production efficiency but has fundamentally redefined the professional boundaries of fashion practitioners. Traditional professional skill models overemphasized manual techniques and singular design capabilities; however, the profound integration of digital twins and artificial intelligence (AI) within the domain of intelligent manufacturing (Huang et al., 2021), coupled with 3D digital technologies, is currently reshaping the entire value chain of fashion design, pattern making, and marketing. Industry demand has pivoted toward hybrid talent possessing both technical expertise and digital literacy. The application of 3D digital technologies, such as Style3D or CLO 3D, is increasingly superseding traditional physical prototyping models (Conlon & Gallery, 2023; Roberts & Bailey, 2025). This transition mandates that designers master nascent hard skills, including virtual simulation, fabric modeling, and digital rendering (Papahristou & Tatsi, 2024).

The shift in industrial operational logic has precipitated the emergence of entirely new professional categories. AI-aided design, virtual try-ons, and sustainable technological innovation have become primary growth sectors in the global fashion market (Roberts & Bailey, 2025). Practitioners are required not only to maintain traditional aesthetic sensibilities but also to effectively employ big data analytical tools to extract and predict fashion design trends (Lee & Suh, 2024). Against this backdrop, academia has proposed a T-shaped competency framework tailored for fashion professionals (Leiby, 2021). This framework delineates the vertical depth of specialized skills alongside the horizontal breadth of cross-functional capabilities. Cross-functional capabilities are defined as non-technical core competencies, encompassing collaborative proficiency and environmental adaptability.

Despite the prevalence of highly automated environments, human factors retain their core value. Creative expression, critical thinking, and complex communication skills are regarded as irreplaceable soft skills (Roberts & Bailey, 2025). These non-technical competencies directly influence organizational innovation efficacy and operational resilience. Specifically, communication, self-management, and managerial coordination have been identified as essential prerequisites for professional success (Labzina et al., 2019). As sustainability issues achieve global consensus, knowledge regarding the green transition and the circular economy has been incorporated into competency evaluation systems (Glogar et al., 2025). Fashion practitioners are increasingly required to possess the capacity to assess environmental impacts and manage sustainable supply chains. This multidimensional skill set constitutes the defining characteristics of modern fashion talent.

2.2. Misalignment between the Labor Market and Education

A significant disparity persists between the quality of talent cultivation in higher education and the pragmatic expectations of the labor market (Alshameri & Adhikari, 2025). This disconnect exacerbates the severe employment pressures faced by graduates while simultaneously complicating recruitment efforts for enterprises seeking personnel with immediate workplace readiness. The curricula of numerous higher education institutions exhibit a pronounced structural inertia, struggling to maintain reciprocal alignment with the rapidly iterating technological standards of the industrial sector. Educational institutions frequently overemphasize traditional craftsmanship while underestimating the long-term value of cross-disciplinary generic competencies for students' career trajectories (Belchior-Rocha et al., 2022). This cognitive bias regarding competency requirements undermines the supportive role of the educational system in facilitating industrial transformation.

Analyses from a social cognitive perspective reveal the deep-seated drivers of this academia-industry misalignment. The higher education system and the labor market employ fundamentally distinct discursive frameworks to delineate competencies (Babich & Ivashchenkova, 2024). While institutions of higher learning tend to utilize abstract academic standards to define cultivation objectives, employers utilize concrete functional requirements to describe recruitment criteria. This contextual divergence results in a prolonged state of isolation between educational outputs and market demands. Even in the cultivation of 21st-century core competencies, a cognitive gap exists between university education and actual industrial performance standards, leading to the ineffective integration of critical

employer requirements—such as communication and collaboration—into pedagogical practices (Rios et al., 2020).

The deficiency in digital skills constitutes the core manifestation of this supply-demand misalignment. Although Industry 4.0 has reshaped the apparel supply chain, the fashion education system has been sluggish in integrating cutting-edge digital technologies, such as artificial intelligence (AI) and virtual reality (VR) (Kohli, 2024). Graduates generally lack a systemic understanding of digitalized production workflows and demonstrate competency deficits when navigating modern fashion business and digital marketing strategies. Due to the lack of profound collaborative mechanisms between academia and industry, instructional content frequently fails to reflect authentic market environments and commercial challenges (Anuar, 2024). This absence of a practical environment hinders students from establishing a cross-functional collaborative mindset. There is an urgent imperative for the educational sector to establish an agile curricular adaptation mechanism, narrowing the supply-demand lacuna by incorporating empirical industrial cases and pioneering digital technologies.

2.3. Application of Content Analysis in Educational Assessment

Identifying competency gaps necessitates objective and scientifically rigorous assessment instruments. Traditional stakeholder perception surveys exhibit inherent limitations in reliability; the perceptions of skills value among academics and students frequently deviate from reality, while the subjective feedback from employers may be confounded by context-specific variables (Messum et al., 2017). In contrast, conducting a content analysis of recruitment job descriptions (JDs) provides a more objective empirical pathway. Job advertisements serve as a direct medium of communication between employers and prospective employees, precisely documenting the market's core requirements for specific roles (Rios et al., 2020). By mining voluminous recruitment texts, researchers can extract the most representative competency indicators.

Content analysis has demonstrated significant efficacy in curriculum revisions across various disciplines. By analyzing the textual content of labor market announcements, educators can identify the most urgently required skill sets within specific professional domains (Li, 2021). This big-data-driven empirical research facilitates the dynamic tracking of shifting industry trends, providing a robust data foundation for updating syllabi. Researchers can leverage techniques such as term frequency importance classification and cluster analysis to quantitatively evaluate the weight distribution of specialized versus generic skills in the labor market. Furthermore, systematically comparing recruitment advertisement

content with existing institutional Learning Outcomes documentation enables the precise identification of specific intervention points for curricular reform (Piróg & Hibszer, 2023).

In processing unstructured recruitment data, advanced text mining technologies significantly enhance analytical precision. Utilizing data mining algorithms to identify latent patterns in technical competencies and revealing the differentiated characteristics of talent demand across regional markets has become a mainstream academic approach for exploring skill alignment (Alshameri & Adhikari, 2025). This computational content analysis pathway enables the systematic extraction of feature terms that reflect authentic functional requirements. Such a market-oriented empirical methodology establishes a foundation of legitimacy for higher education institutions to construct interdisciplinary talent cultivation and recruitment frameworks.

3. Methodology

3.1. Research Design

This study adopts a content analysis methodology integrated with data mining techniques. Traditional qualitative content analysis relies heavily on manual coding; however, this study introduces Natural Language Processing (NLP) technologies to process unstructured recruitment texts. This algorithmic-based quantitative text mining facilitates the objective identification of latent skill patterns within the labor market. The research framework synthesizes feature extraction algorithms and topic clustering models. The empirical design ensures scientific rigor and replicability in processing large-scale industrial textual data.

3.2. Data Collection

Data acquisition was finalized on April 10, 2026. The sample source focused specifically on the Chinese fashion industry. Adhering to the principle of random sampling, 13 representative apparel enterprises were selected. Data were retrieved from official corporate websites and mainstream online professional recruitment platforms. A total of 119 valid job advertisements were collected. Sample screening followed strict industry-relevance criteria. The scope of text collection was precisely locked onto three core modules: job requirements, professional qualifications, and work responsibilities. This structured sampling approach ensures the diversity and representativeness of the sample data.

3.3. Data Processing and Analysis

Textual data analysis utilized NLP and text mining algorithms. During the pre-processing stage, raw texts underwent deduplication and stop-word removal. To establish a granular and

homogeneous corpus for algorithmic modeling, the 119 initial full-text job advertisements were subjected to sentence-level segmentation based on standard syntactic delimiters (such as periods and semicolons). This preprocessing procedure yielded a refined dataset consisting of 1,596 discrete, valid textual records or analytical units, which served as the foundational documents for subsequent quantitative evaluations. This study applied the Term Frequency-Inverse Document Frequency (TF-IDF) index to extract core competency feature words from the segmented job descriptions. By calculating the global weight of terms, the TF-IDF algorithm effectively filters out generic corporate promotional vocabulary. Subsequently, Latent Dirichlet Allocation (LDA) was introduced for unsupervised topic clustering analysis using these 1,596 textual units. This computational content analysis pathway eliminates the subjective bias inherent in manual coding. The quantitative indicators extracted by the algorithms directly construct a competency matrix that reflects authentic employer demands.

4. Results

4.1. TF and TF-IDF Analysis

To ensure the scientific rigor and objectivity of the research findings, this study first performed rigorous preprocessing and feature extraction on the crawled recruitment advertisement texts. According to the foundational system statistics, this analysis encompasses 1,596 valid recruitment records, with the raw corpus totaling 43,619 characters and a post-segmentation vocabulary of 12,540 words. Following stop-word removal and part-of-speech (POS) filtering, the system ultimately extracted 2,106 valid feature words. The overall corpus exhibits a high lexical density of 80.91%, with an average sentence length of 7.86 words. This linguistic pattern of high density and short-sentential structures typically reflects the pragmatic and concise expressive habits of employers when articulating recruitment requirements. To systematically identify core skill demands in the labor market, this research utilized both Term Frequency (TF) and Term Frequency-Inverse Document Frequency (TF-IDF) algorithms to quantitatively evaluate and rank the weights of the extracted feature words. The detailed data for the core feature words are presented in **Table 1**.

Table 1

Statistical Summary of Core Feature Words in Recruitment Texts: TF and TF-IDF (Top 15)

Rank	Feature Word	Part of Speech (POS)	Term Frequency (TF)	Document Frequency (DF)	TF-IDF Weight
1	Work	N./V.	190	177	0.0144

2	Product	N.	151	111	0.0138
3	Responsible	V.	151	143	0.0125
4	Ability	N.	126	103	0.0119
5	Design	N./V.	117	88	0.0116
6	Related	V.	132	125	0.0116
7	Live-streaming	N./V.	109	75	0.0114
8	Management	N./V.	121	103	0.0114
9	Sales	N./V.	118	105	0.011
10	Experience	N.	110	90	0.0109
11	Requirement	V.	114	112	0.0104
12	Complete	V.	109	106	0.0102
13	Priority	N./V.	99	91	0.0097
14	Possess	V.	98	94	0.0095
15	Team	N.	90	78	0.0093

Term Frequency (TF) analysis intuitively reveals the primary focal points within the employers' recruitment discourse. From the perspective of "Term Frequency" in Table 1, beyond the foundational verbs that construct job descriptions—such as "Work" (190), "Responsible" (151), and "Complete" (109)—professional functional vocabulary occupies a dominant position. The frequent appearance of "Product" (151), "Management" (121), "Sales" (118), and "Design" (117) outlines a classic value chain model for the apparel and retail industry. This suggests that enterprises are highly covetous of talent capable of driving product R&D while mastering terminal sales and store operations management. Furthermore, the high frequency of terms like "Ability" (126), "Requirement" (114), and "Experience" (110) indicates a strong pragmatic orientation in talent selection. Employers prioritize "plug-and-play" practical experience and the comprehensive capacity to resolve complex

problems over formal academic backgrounds. Notably, the term “Live-streaming” ranks prominently with a frequency of 109, providing robust quantitative evidence for the industry’s digital channel transformation and indicating that new media business models have profoundly altered grassroots job structures.

In contrast to simple frequency counts, the TF-IDF algorithm effectively penalizes “noise words” ubiquitous across documents by introducing Inverse Document Frequency (IDF), thereby highlighting core feature words with high discriminative power and representational significance for specific roles. According to the TF-IDF weight rankings, “Product” (0.0138) and “Ability” (0.0119) maintain their paramount importance, reaffirming that “product-centricity” and “competency-orientation” are the unshakable logics of the current labor market. Critically, the weights for “Design” (0.0116) and “Live-streaming” (0.0114) rank significantly high under the TF-IDF algorithm. This mathematical property suggests that these terms are not merely generic industry jargon but are concentrated within specific, high-value job descriptions, representing the core technical barriers and nascent marketing channel capabilities most urgently required by enterprises.

Synthesizing the results of both TF and TF-IDF analyses, it is evident that the talent profile demanded by industry employers has undergone a substantive reconstruction. Enterprises are no longer satisfied with traditional employees possessing singular knowledge of “apparel” or “merchandise.” Instead, there is an urgent demand for “hybrid” or “T-shaped” talent. Such individuals must be capable of working independently in traditional domains of “product” and “management”—possessing solid professional “experience” and a “team” spirit—while simultaneously demonstrating high adaptability and acuity toward emerging digital sectors such as “live-streaming” and “operations.” This empirical conclusion, derived from large-scale text mining, provides a solid and objective data foundation for the subsequent analysis of the “Skill Gap” between higher education systems and the authentic labor market.

4.2. LDA Topic Analysis

Following the preliminary calculation of term frequencies and TF-IDF weights, a Latent Dirichlet Allocation (LDA) topic model was constructed to further elucidate the latent semantic structures and macro-dimensions of employer requirements embedded within the recruitment texts. During the model training phase, 392 unclassified texts with indistinct features were excluded, allowing the analysis to focus on the two core topics with the most distinct categorical boundaries. The results indicate that the mean classification scores for these two topics reached 0.88 and 0.87, respectively. Furthermore, the topic attribution scores

for the vast majority of texts were concentrated within a high-confidence interval of 0.8 to 1.0, demonstrating that the LDA model achieved superior clustering efficacy on the recruitment corpus and that the extracted topics possess a high level of internal consistency and interpretability.

Based on the lexical probability distribution features and semantic logic output by the model, these two topics were designated as "Core Job Responsibilities and Business Operations" (Topic 1) and "Professional Skills and Role Competencies" (Topic 2). Detailed topic distribution statistics and core vocabularies are presented in **Table 2**.

Table 2

LDA Topic Clustering and Distribution Statistics of Recruitment Texts

Topic	Topic Label	Document Count	Document Percentage (%)	No. of Topic Words	Mean Score	Core Feature Words
Topic1	Core Job Responsibilities and Business Operations	663	41.54%	102	0.88	Product, Management, Sales, Design, Company, Store, Brand, Merchandise, Operations, Data, Analysis
Topic 2	Professional Skills and Role Competencies	541	33.90%	100	0.87	Ability, Experience, Live-streaming, Priority, Team, Professional, Apparel, Software, Collaboration, Platform, Education

Note. The remaining 24.56% (392 textual records) represents unclassified texts with indistinct semantic features and was excluded prior to final topic extraction to maximize cluster interpretability.

4.2.1. Topic 1: Core Job Responsibilities and Business Operations

This topic occupies a predominant position within the valid sample, encompassing 663 textual records and accounting for 41.54% of the corpus. As illustrated in the network diagram, the nodes associated with Topic 1 (highlighted in the red region) concentrate on the business workflows of enterprise daily operations. Core terms such as Product, Management, Sales, Store, Operations, and Data constitute a densely interconnected co-occurrence network. The recruitment descriptions explicitly delineate the specific tasks to be undertaken upon

employment. The industrial value chain exhibits distinct omnichannel characteristics: the front-end involves design and product planning; the mid-end comprises branding and merchandise allocation; and the back-end culminates in store sales and data analysis. There is an evident industrial demand for management and operational talent capable of orchestrating end-to-end business linkages.

4.2.2. Topic 2: Professional Skills and Job Competencies

Topic 2 consists of 541 textual records, representing 33.90% of the sample. The cluster of green nodes reflects the specific requirements imposed by employers regarding candidate qualifications. Terms such as Ability, Experience, and Professional constitute the foundational criteria for talent screening. Team and Cooperation emphasize the importance of cross-departmental collaborative literacy. Notably, terms such as Live-streaming, Platform, Software, and Short Video exhibit high weights and strong correlations within this topic. This semantic clustering objectively reflects the talent demand characteristics of the digital era. The apparel industry is currently transitioning toward a New Retail paradigm characterized by the integration of online and offline channels. Consequently, hybrid talent with experience in new media operations, familiarity with the live-streaming ecosystem, and proficiency in digital software tools has become a core requirement for enterprises.

4.2.3. Semantic Interaction and Synergistic Relationships between Topics

The semantic interaction network based on the LDA model reveals the co-occurrence and interplay between the topic words (Figure 1). While the two topics have distinct focal points, significant cross-connections exist. Statistics indicate 22 shared terms between the two topics. Keywords such as Work, Product, and Management are distributed across the boundary regions of both topics, serving as semantic bridges that link business responsibilities (Topic 1) with individual competencies (Topic 2). This network structure suggests that corporate recruitment standards are highly result-oriented. The setting of professional qualifications—such as experience, expertise, and live-streaming capabilities—is strictly designed to serve practical business imperatives, including store operations, product sales, and brand promotion. The synergistic logic between job configurations and competency requirements is quantitatively visualized through the probability network of the LDA model.

Figure 1

Topic word co-occurrence and semantic interaction network based on LDA model

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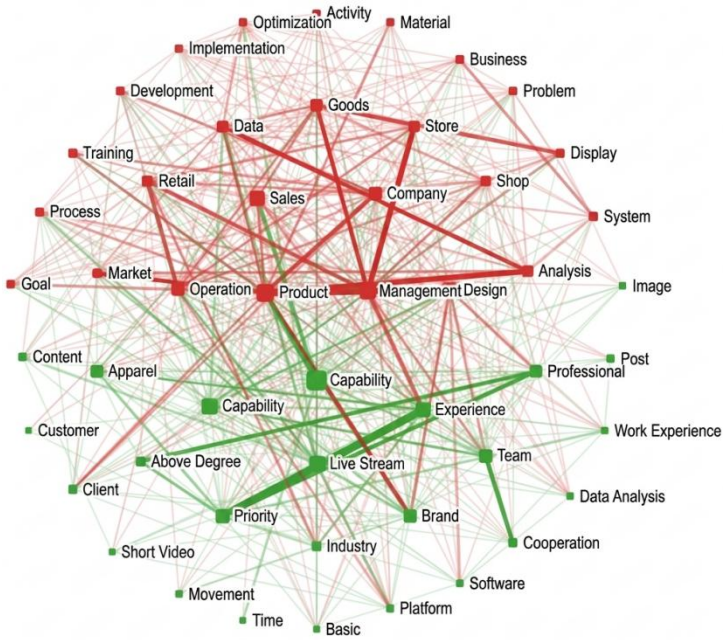

5. Discussion & Implications

5.1. Discussion of Findings

By collecting 119 job advertisements from 13 apparel enterprises and conducting in-depth mining of 1,596 valid textual records, this study clarifies the authentic labor demand characteristics of the contemporary apparel and retail sectors within the context of digital transformation. These quantitative findings not only corroborate the core theories identified in the preceding literature but also provide highly explanatory micro-evidence for understanding the skills mismatch between academia and industry.

Firstly, the TF-IDF analysis highlights the disruptive impact of emerging digital business models on traditional industrial boundaries. The prominence of high-weight feature words such as “live-streaming” and “operations” directly validates the arguments that Industry 4.0 and digital technologies have fundamentally altered the operational modalities of the fashion and retail industries. Enterprises no longer focus exclusively on traditional design or manufacturing; instead, they regard consumer-facing digital marketing strategies and operational capabilities as their core competitive advantages.

Secondly, the two core dimensions extracted by the LDA topic model—namely “Core Job Responsibilities and Business Operations” and “Professional Skills and Role Competencies”—perfectly resonate with the T-shaped competency framework. Enterprise demand for talent encompasses both horizontal cross-functional comprehension and vertical specialized expertise.

Finally, the results substantiate the socio-cognitive discursive discrepancies existing between education and industry. Within Topic 2, terms such as “experience,” “ability,” and “preferred/priority” occupy exceedingly high weights, whereas traditional academic evaluation indicators are conspicuously absent. This indicates that employers define talent standards through concrete functional performance, whereas higher education institutions frequently remain entrenched in a pedagogical context oriented toward academic credentials. This disconnects in discursive contexts constitutes the core driver of the employment challenges currently confronting graduates.

5.2. Governance Interventions and Curriculum Optimization

In light of the explicit market demands revealed by the data, higher education institutions must divest themselves of traditional, lagging response models and reconstruct talent cultivation and recruitment syllabi through agile pedagogical and governance interventions.

Firstly, institutional governance structures must establish an agile curriculum reconfiguration mechanism. University leadership should dismantle the antiquated administrative silos that separate traditional craftsmanship from digital engineering. University administrators need to establish a cross-functional governance committee comprising academic deans, software engineers, and industry executives. This governance body will hold the mandate to dynamically review labor market analytics and mandate the deep integration of 3D virtual simulation technologies, digital marketing, and consumer data analytics into the core fashion curricula as compulsory, credit-bearing modules.

Secondly, school governance must actively promote structural partnerships to implement formalized Work-Based Learning (WBL) systems. Educational leaders should secure institutional agreements with apparel enterprises to co-design training environments. Rather than relying on unstructured internships, institutional governance frameworks must embed authentic corporate projects and e-commerce live-streaming studio operations directly into the university’s formal quality assurance and assessment criteria. This administrative alignment effectively truncates the graduate transition period from school to the workplace.

Thirdly, to ensure inclusive school governance, university administrators must design targeted support mechanisms for students lacking foundational digital literacy. The transition toward a digitally driven curriculum must not marginalize students trained exclusively in traditional design aesthetics. Governance policies should allocate institutional resources to establish parallel “digital scaffolding” bootcamps, peer-assisted technical mentoring programs, and flexible, multi-dimensional assessment criteria. This proactive approach ensures equitable access to emerging technical competencies, thereby safeguarding educational equity and

fostering high-quality employability for all student cohorts within the transformed academic ecosystem.

5.3. Limitations of the Study

Although this study utilizes big data text mining technologies to provide an objective, quantitative perspective for identifying skill demands, certain boundary conditions persist.

Firstly, there are spatiotemporal limitations regarding the coverage of data sources, as the sample was primarily crawled from online recruitment platforms, which may naturally reflect a higher concentration of medium and large-sized enterprises active on digital channels.

Secondly, the analytical granularity is governed by the structural properties of probabilistic text mining. The TF-IDF and LDA models employed in this study are optimized for detecting macro-level thematic clusters and word co-occurrence regularities across the corpus. While these bag-of-words algorithms provide highly reliable patterns of overall employer priorities, they do not inherently map complex syntactic dependencies or long-text contextual subtexts. Rather than indicating a methodological deficit, this boundary highlights a promising trajectory for future research. Subsequent longitudinal investigations can incorporate deep learning transformer architectures, such as BERT-based semantic embeddings, to further parse the granular syntax of job requirements and track the chronological evolution of specific skill proficiencies over extended temporal scales.

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Data Availability

No datasets were generated or analysed during the current study.

Declarations

Conflict of interest

The authors declare that there is no Conflict of interest.

Ethics approval

Not applicable.

Consent to participate

Not applicable.

Consent for publication

All authors have given their consent.

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