Journal of Contemporary Educational Research, 2024, Volume 8, Issue 6
http://ojs.bbwpublisher.com/index.php/JCER
ISSN Online: 2208-8474
ISSN Print: 2208-8466

Research on the Generation of Professional Skill Modules for Talent Cultivation in the Landscape Architecture Profession for Industry-Education Integration of Small and Medium-Sized Enterprises

Fengyi Xu*, Yang Su

Yunnan Light and Textile Industry Vocational College, Kunming 650000, Yunnan Province, China

Corresponding author: Fengyi Xu, fengyi.e.xu@gmail.com

Abstract: Due to industry characteristics or regional limitations, many students in certain majors tend to seek employment in small and medium-sized enterprises (SMEs). SMEs face certain challenges in implementing industry-education integration, and there is a lack of mature methods in specific implementation processes and talent cultivation plan generation. Taking the landscape architecture profession as an example, this paper conducts a correlation analysis and cross-analysis of the industry-required professional skills based on surveys of over 300 industry practitioners employed in SMEs. It provides professional skill cultivation modules based on market feedback. This research process and analysis method have certain reference significance for the rapid production of adaptive talent cultivation professional skill modules in other industries targeting SMEs.

Keywords: Landscape architecture profession; Talent cultivation; Industry-education integration; Small and medium-sized enterprises

Online publication: July 3, 2024

1. Research background

With the slowing down of urbanization, the landscape architecture industry is further transitioning towards small and medium-sized enterprises (SMEs). Small-scale landscape architecture enterprises offering flexible services are gradually becoming the mainstream of employment for graduates. Individual SMEs absorb fewer talents, and they are limited in conducting talent cultivation through standardized cooperation and order-based training. Analyzing the most common talent skill demands of employers becomes essential in exploring industry-education integration and formulating talent cultivation plans in such professions. Additionally, the emergence of technologies and concepts such as big data, 5G, and smart cities continuously imposes new demands on existing positions in various industries, posing high requirements for higher education to quickly and scientifically respond to market needs.

Regarding the relationship between learning and work, Raelin emphasized the importance of job-based learning, stating that strengthening dialogue with employers to meet social and labor market needs is crucial [1]. In formulating talent cultivation plans, Boud *et al.* propose that curriculum design should follow the actual needs of learners in the workplace rather than develop based on disciplinary logic [2]. Currently in China, under the background of industry-education integration, the alternating work-study model and the "2+1" industry-academia-research education model have been vigorously promoted. Some enterprises participate in the entire process of talent cultivation from the generation to the execution of talent cultivation plans, which is particularly significant in the cooperation format of "order classes." However, the promotion mechanism within industries primarily composed of small and medium-sized enterprises is not yet clear. Zhejiang Institute of Economics and Trade Vocational and Technical College proposed a solution for issues such as "few job positions, rapid changes in business, unstable development, with most energy and resources mainly invested in production and operation activities" by suggesting to "build an industry-education integration platform with industry associations as the link, gather enterprise forces, and concentrate on expressing enterprise demands" [3]. The specific implementation process and methods of this approach await further exploration and practice.

2. Research design

2.1. Data collection

In this study, data collection was conducted in collaboration with the Yunnan Provincial Landscape Industry Association and the Kunming Municipal Landscape Industry Association. An online questionnaire was used to investigate the professional skill demands of typical positions in the landscape industry, with a total of 326 industry practitioners surveyed, resulting in 320 valid questionnaires. Combining the current recruitment demands of small and medium-sized landscape enterprises in China and talent cultivation programs from over 20 landscape architecture programs in China, the questionnaire included six typical positions and 24 professional skills.

2.2. Research methods

Association rules were first proposed by Agrawal *et al.* in 1993 when studying consumer shopping baskets [4]. They involve discovering frequent correlations among itemsets from large datasets, primarily reflecting the association between items. In this study, association rules mining using the Apriori algorithm was employed to explore the relationships between job skills. The chi-square test, proposed by the renowned statistician Karl Pearson in 1900, is a hypothesis test method to judge whether events are related [5]. In this study, the multiple-choice results of job skills were transformed into multiple response sets for frequency analysis and independence testing of contingency tables, aiming to provide valuable suggestions for setting skill modules for different professional directions in the talent cultivation programs of landscape architecture. The overall research method is shown in **Figure 1**.

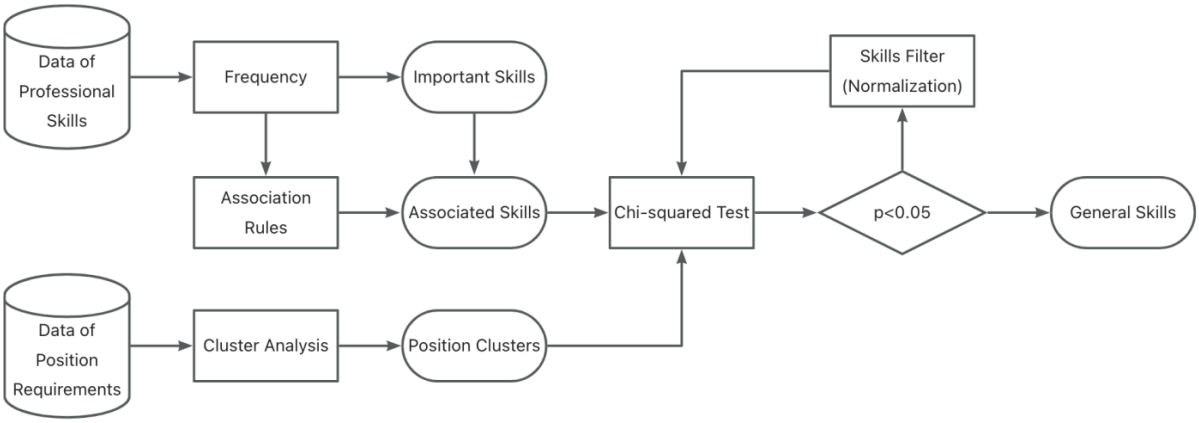

Figure 1. Research framework

3. Data analysis

3.1. Association analysis of professional skills

In the association analysis of professional skills, confidence is set as the main evaluation metric with 60% as the lowest limit in this study, and the final analysis is shown in **Figure 2**. It is shown that the following skills, including Planting Design, Multi-Scale Landscape Planning and Design, Computer-Aided Drawing Production, Construction Drawing, Construction Management, Green Space Maintenance, and Plant Cognition have stronger connections in the network. It could be explained that these "strong association" skills are connected with more workflows that have continuous work missions. Therefore, identifying the associated skills could help in digging professional skills modules, as well as providing guidance or reference for the establishment and adjustment of a talent training development program.

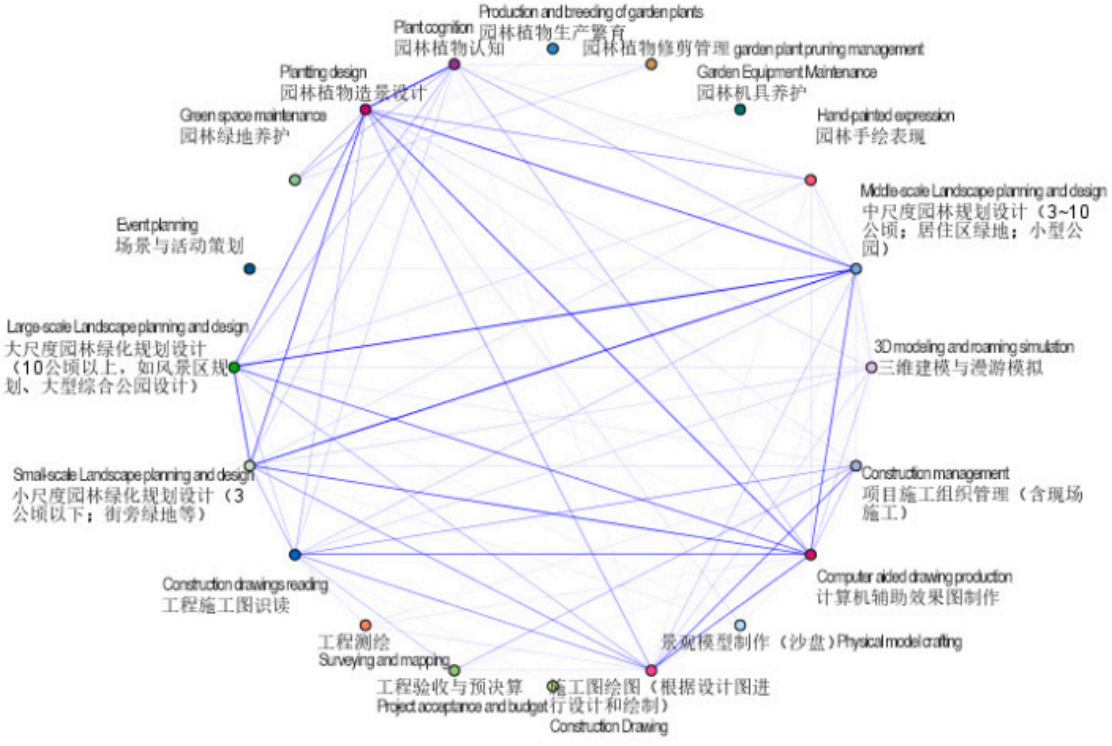

Figure 2. Association network of demanded professional skills

Through statistical analysis of frequent itemsets, several typical skill combinations were obtained, which could be divided into four major skill combinations according to the actual industry "work task flow": "output plan, implementation promotion, implementation management, post-maintenance." It can be seen that skills such as "Landscape Architecture Design, Computer-Aided Rendering Production, Engineering Construction Drawing Reading, and Construction Drawing Drafting" play an important "connecting" role between various work task flows.

3.2. Cluster analysis of professional positions

Due to the huge difference between the sample sizes of these six occupations, the cross-analysis in this research mainly focuses on the professional skills comparison between designer, construction worker, and gardener, as well as green maintenance. The chi-square test is used to further explore the general skill modules between them. For all 24 skills, the differences in the three pairs of job skills are significant at the 99% level. The study visualizes the job-skill contingency table to assist in the discovery that certain jobs have stronger similarities in professional skill requirements. Combined with the results of correlation analysis, typical professional skills are tested in the chi-square test. Since the total number of cases is greater than 40, and the skill expected frequency values are greater than 5, the classic Pearson chi-square calculation is used below. In terms of designers and construction workers (**Table 1**), there is no significant difference in the demand performance of "BIM application and management, tender text production, construction drawings reading, and construction drawing" between the two positions ($P = 0.511 > 0.05$). Among them, construction documents reading and drawing have strong correlation skills in correlation analysis and they play an important role in the procedure from design to implementation.

In terms of designers and gardeners (**Table 2**), there is no significant difference in the demand performance of the two positions for the "small-scale and middle-scale landscape planning and design, hand-painted expression, and physical model crafting (sand table)" ($P = 0.636 > 0.05$). In addition to these four skills, designers are more demanding than gardeners in large-scale planning and design, as well as construction skills, while gardeners are much stronger than designers in terms of garden plant cognition and garden plant landscaping. This is why, although landscape architects and gardeners are in similar positions in the traditional view according to the interview, the job cluster analysis shows that the overall skill requirements of designers are closer to those of construction workers than gardeners.

In terms of gardeners and green maintenance (**Table 3**), there is no significant difference in the demand performance of "garden plant pruning management, garden plant production and breeding, garden plant cognition, and planting design" at the level of 0.01 ($P = 0.035 > 0.01$), and there is a difference at the level of 0.05 ($P = 0.035 < 0.05$). This shows that even for the most core and similar four basic plant application skills, the demand for each skill of the two positions is quite different. According to the research result, talent training in the two positions of gardener and green maintenance might deviate earlier and larger than used to be thought in traditional training programs.

Table 1. Test results of construction worker and designer

Title	Name	Professional position (%)		Sum	χ^2	*P*
		Construction worker	Designer			
Skill	BIM application and management	23 (14.20)	25 (17.12)	48 (15.58)	2.308	0.511
	Construction drawings reading	60 (37.04)	47 (32.19)	107 (34.74)		
	Tender text production	23 (14.20)	28 (19.18)	51 (16.56)		
	Construction drawing	56 (34.57)	46 (31.51)	102 (33.12)		
	Sum	162	146	308		

*$P < 0.05$, **$P < 0.01$

Table 2. Test results of gardener and designer

Title	Name	Professional position (%)		Sum	χ^2	*P*
		Gardener	Designer			
Skill	Middle-scale landscape planning and design	43 (26.22)	49 (29.17)	92 (27.71)	1.704	0.636
	Hand-painted expression	43 (26.22)	37 (22.02)	80 (24.10)		
	Small-scale landscape planning and design	45 (27.44)	53 (31.55)	98 (29.52)		
	Physical model crafting (sand table)	33 (20.12)	29 (17.26)	62 (18.67)		
	Sum	164	168	332		

*$P < 0.05$, **$P < 0.01$

Table 3. Test results of gardener and green maintenance

Title	Name	Professional position (%)		Sum	χ^2	*P*
		Gardener	Green maintenance			
Skill	Garden plant pruning management	53 (24.31)	75 (30.00)	128 (27.35)	8.58	0.035*
	Garden plant production and breeding	49 (22.48)	61 (24.40)	110 (23.50)		
	Garden plant cognition	47 (21.56)	64 (25.60)	111 (23.72)		
	Planting design	69 (31.65)	50 (20.00)	119 (25.43)		
	Sum	218	250	468		

*$P < 0.05$, **$P < 0.01$

4. Conclusion and outlook

This study analyzed the professional skill demands of landscape architecture oriented toward employment and proposed a workflow framework for the joint development of talent cultivation plans from employer surveys to industry-education plans. Taking the landscape architecture profession as an example, the study proposed a feasible path for the joint construction of talent cultivation plans based on small and medium-sized enterprises and provided a reference for implementation processes. The rapid feedback mechanism of employers can quickly convey changes in the industry market trend, largely alleviating the lag in traditional university talent cultivation and responding digitally to national talent cultivation policies at the formulation level. This helps vocational colleges in such professions to improve talent cultivation programs, further clarifying the direction and focus of school-enterprise cooperation around the concept of "job-based learning," enhancing the efficiency of talent cultivation and the quality of employment, and promoting the long-term healthy development of the industry.

Funding

Yunnan Provincial Department of Education Scientific Research Fund Project "Construction and Development of 'Loose-Leaf' Teaching Material Resources for Landscape Engineering Vocational Education" (Project number: 2022J1725)

Disclosure statement

The authors declare no conflict of interest.

References

[1] Raelin JA, 1997, A Model of Work-Based Learning. Organization Science, 8(6): 563–578.

[2] Boud DJ, Solomon N, 2001, Work-Based Learning: A New Higher Education? Society for Research into Higher Education & Open University Press, Philadelphia, PA, 4–5.

[3] Tianjin Vocational Institute, 2022, "Industry Association +" New Model of Industry-Education Integration for Small, Medium and Micro Enterprises, viewed March 28, 2023, https://hzb.tjtc.edu.cn/info/1010/4549.htm

[4] Agrawal R, Imielinski T, Swami A, 1993, Mining Association Rules Between Sets of Items in Large Databases, Proceedings of the 1993 ACM SIGMOD International Conference on Management of Data, May 26–28. Sigmod Record, Washington DC.

[5] Chernoff H, Lehmann EL, 1954, The Use of Maximum Likelihood Estimates in χ^2 Tests for Goodness of Fit. Annals of Mathematical Statistics, 25(3): 579–586.