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Optimizing the Teaching Objectives of the Big Data Intelligent Marketing Course Cluster Based on Job Competency Requirements

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Abstract. Based on the analysis of job competency requirements, this study optimizes the teaching objectives of the "Big Data and Intelligent Marketing" course cluster. Two rounds of data collection from recruitment websites were conducted, obtaining 7,328 and 12,476 valid data entries, respectively. Twelve types of marketing-related positions and 16 core capabilities were identified, including five marketing analysis capabilities (e.g., demand analysis), six specialized marketing functional capabilities (e.g., customer relationship management), and five general management capabilities (e.g., teamwork). The study found that demand analysis and teamwork are universally valued core capabilities across various positions, while the demand for specialized marketing functional capabilities varies with different positions. Accordingly, a three-dimensional optimization framework is proposed: to strengthen the cultivation of data-driven marketing analysis capabilities, focus on applying technical tools in specialized marketing functional scenarios, and enhance general management capabilities through project-based teaching. The research results closely align the teaching objectives of the course cluster with industry needs, thereby improving students' employability competitiveness.

Keywords: Marketing major; big data; intelligence; course cluster; teaching objectives

1. Introduction

The Chongqing University of Posts and Telecommunications marketing major leverages the school's academic strengths in big data and artificial intelligence. It is dedicated to cultivating marketing professionals focusing on big data and intelligent technologies. To support these professional training objectives effectively and highlight these features, the major has established a "Big Data Intelligent Marketing" course cluster. Initially, the cluster comprises five courses: Introduction to Business Data Science; Statistics (theory course + independent lab course); Marketing Engineering Application Experiment; Big Data Marketing; and Intelligent Marketing. As a newly established course cluster, there is no mature construction experience from similar domestic majors to draw upon. In order to build this course cluster effectively, it is necessary to optimize its teaching objectives.

Big data and intelligent technologies are in a period of rapid development. In the field of marketing, big data and intelligent technologies have numerous development directions and application scenarios, and different enterprises have various demands for employee capabilities. Optimizing the teaching objectives of this course cluster raises the following question: Which capabilities should we focus on cultivating in students? If the capabilities cultivated do not meet the needs of enterprises or simply overlap with other majors without the characteristics of the marketing major, students will lack competitive advantages in the job market. To address these problems, this paper will analyze the capability requirements of marketing-related positions based on online recruitment information. Then, it will optimize the teaching objectives of the "Big Data Intelligent Marketing" course cluster.

The relevant literature includes two categories. The first category involves analyzing job competency requirements based on online recruitment information. This includes constructing analysis frameworks [1] and mining demand characteristics [2]. There are also analyses targeting major training objectives [3] and course teaching objectives [4]. Compared to analyses based on questionnaires [5], analyses based on online recruitment information collect larger amounts of data and yield more objective results. The second category comprises research on constructing course clusters in economic and management majors. This research emphasizes the background of big data [6,7], alignment with industrial chains [8], and Outcome-Based Education (OBE) [9]. The first category lacks analysis of job competency requirements for the marketing major, and the second category lacks optimization for the big data intelligent marketing course cluster. Focusing on the marketing major and the big data intelligent marketing trend, this study aims to provide ideas and suggestions for constructing professional course clusters.

2. Research design

This study is divided into three steps.

First, we identified positions recruiting marketing professionals. To obtain data, we selected two major recruitment websites: Lagou and 51Job. These websites are representative of China's talent recruitment market. Lagou focuses on Internet industry recruitment, and 51Job is one of the largest recruitment websites in China. The recruitment information collected from these websites is representative. We identified positions available to marketing professionals, extracted keywords from these job titles, and summarized these positions.

The second step was to summarize the capability requirements of these positions for applicants. Using the job titles obtained in the first step, we collected data again from Lagou and 51Job. We obtained the capability requirements (textual descriptions) for these positions, identified capability keywords, categorized and counted, and summarized the capability requirements for marketing professionals in different positions.

The third step is to optimize the teaching objectives of the "Big Data Intelligent Marketing" course cluster based on the results of the first two steps' analysis. We will propose ideas for optimizing the course teaching objectives in combination with job competency requirements and course characteristics.

3. Identification of recruitment positions related to marketing major

We obtained 21,927 recruitment position data using the "Octopus" data collection software from two recruitment websites: 14,771 from Lagou and 7,156 from 51Job. The collected

fields included job titles, applicants' majors, and other information. After cleaning the data, we retained 7,328 entries. The applicant major requirements for these positions fell into three categories: "Marketing" was explicitly required (459 from Lagou and 574 from 51Job); "Business Administration" or a related economic management major was required (33 from Lagou and 189 from 51Job); and no major restrictions were imposed (2,702 from Lagou and 4,626 from 51Job). All of these positions are available to applicants with a major in "Marketing."

We extracted the job title field from the recruitment position data and counted the keywords, retaining those that appeared more than 100 times. We then removed keywords that were clearly unrelated to marketing or had ambiguous meanings (e.g., accountant, consultant, reserve cadre), ultimately obtaining 12 job title keywords, as shown in Table 1. These keywords represent 12 categories of recruitment positions related to the marketing major.

Table 1. Recruitment Positions Related to the Marketing Major

ID	Job Title Keyword	Frequency
1	Sales	1401
2	Management	810
3	Marketing	161
4	Product	358
5	Operation	795
6	Brand	186
7	Customer	322
8	Channel	145
9	Procurement	244
10	Service	356
11	Data Analysis	112
12	Customer Service	166

Note: The frequency count is based on 7328 recruitment position data.

4. Identification of capability requirements for applicants in recruitment positions

Using Python web crawler programs and the "Octopus" data collection software, we searched for 12 job title keywords in Table 1 on Lagou and 51Job. We collected data precisely for recruitment positions related to the marketing major and obtained a total of 12,539 recruitment position records. We removed duplicate recruitment position data; for example, if an enterprise was recruiting for the same job title in the same region, only one entry was retained. Data for the same job title in different regions by the same enterprise were retained (considered different recruitment demands). After deduplicating the data, we obtained 12,476 valid entries, 6,383 of which were from Lagou and 6,093 of which were from 51Job.

We analyzed the job requirements (textual descriptions) of these recruitment positions. Using Python and GooSeeker Chinese word segmentation software, we cleaned the data, segmented the words, and removed stop words. We retained keywords that appeared more than 500 times. We obtained keyword statistics for job capability requirements and summarized them into 16 capabilities, as shown in Table 2.

Table 2. The 16 Capabilities Required by Marketing-Related Recruitment Positions

ID	Capability	Keywords for Job Capability Requirements			
1	Data Analysis Capability	Data analysis	Data processing	Data sorting	
2	Demand Analysis Capability	Demand research	Demand report	Market demand	Customer demand
3	Competitive Product Analysis Capability	Competitive product analysis	Competitor analysis		
4	Consumer Analysis Capability	Consumer psychology	Consumer behavior		
5	User Profiling Capability	Design user profiling	User profiling analysis		
6	Product Development Capability	Product design	Product development		
7	Product Lifecycle Management Capability	Product lifecycle	Project lifecycle management	Full lifecycle	Lifecycle closed loop
8	Supply Chain Management Capability	Supply chain setup	Supply chain management	Supply chain optimization	Supply chain development
9	Channel Management Capability	Channel management	Channel operation	Channel development	Channel maintenance
10	Customer Relationship Management Capability	Customer relationship management	Customer maintenance	Customer retention	Customer development
11	Advertising Planning Capability	Advertising design	Graphic design	Product promotion	
12	Teamwork Capability	Teamwork	Team management	Cross-team communication	Communication ability
13	Process Planning Capability	Process design	Process planning	Process management	
14	Resource Planning Capability	Resource planning	Resource allocation		
15	Risk Control Capability	Risk control	Risk identification	Risk prevention	Risk assessment
16	Management System Construction Capability	Build system	Build framework		

The 16 capabilities listed in Table 2 can be divided into three categories. The first category includes marketing analysis capabilities, such as data analysis, demand analysis, competitive product analysis, consumer analysis, and user profiling. The second category comprises marketing-specific, function-related capabilities, such as product development, product lifecycle management, supply chain management, channel management, customer relationship management, and advertising planning. The third category comprises general management capabilities, such as teamwork, process planning, resource planning, risk control, and management system construction.

We analyzed the capability requirements of applicants for recruitment positions related to the marketing major by combining the 12 categories of positions in Table 1 and the 16 capabilities in Table 2. To display the data more intuitively and facilitate comparison, we converted the frequency with which each capability was mentioned for each category of positions into percentages. For example, of the 1,070 procurement position data entries, 61 required applicants to have "product lifecycle management capability." Thus, the percentage corresponding to product lifecycle management capability for procurement positions is 5.7%. This percentage represents the demand level of this capability for this category of positions. The capabilities mentioned in the most recruitment data are the most common, basic, and important for that position. Table 3 shows the demand for the 16 capabilities among the 12 position categories.

Table 3. Capability Requirements for Each Category of Positions

	Categories of Positions											
	Procurement	Product Manager	Customer Service	Customer Manager	General Management	Service	Brand Planning	Channel Management	Data Processing	Operation	Sales	Comprehensive Marketing
Data Analysis Capability	14.7	40.2	8.6	9.1	23.5	15.8	23.5	22.1	96.6	48.3	8.8	22.6
Demand Analysis Capability	32.1	76.3	28.8	47.5	31.7	34.0	36.6	30.0	47.6	33.9	45.5	37.7
Competitive Product Analysis Capability	1.2	24.5	0.3	3.9	3.6	1.4	10.6	7.8	3.8	9.8	3.0	5.8
Consumer Analysis Capability	2.7	9.6	6.6	4.7	3.3	3.0	7.3	5.5	13.9	5.5	4.2	7.2
User Profiling Capability	0.0	1.6	0.0	0.1	0.2	0.0	0.4	0.7	4.4	1.9	0.0	1.0
Product Development Capability	6.5	74.3	2.3	7.6	18.2	19.5	20.7	5.3	16.1	11.1	5.5	12.2
Product Lifecycle Management Capability	5.7	19.9	1.0	3.1	9.5	4.1	3.3	1.7	6.1	5.8	1.2	3.5
Supply Chain Management Capability	82.7	10.3	1.9	2.1	8.8	3.8	6.3	3.8	3.9	4.0	1.3	4.5
Channel Management Capability	16.7	7.0	9.0	28.2	5.9	4.2	28.9	90.6	6.1	18.7	34.8	30.7
Customer Relationship Management Capability	3.1	8.5	28.5	60.4	8.8	17.9	12.2	48.8	3.5	9.7	71.6	34.8
Advertising Planning Capability	1.0	2.4	0.8	6.3	1.7	1.2	44.3	8.2	3.4	11.6	8.3	21.4
Teamwork Capability	33.6	80.6	25.6	29.5	44.7	40.6	44.5	26.3	36.0	35.0	27.1	34.7
Process Planning Capability	17.8	76.5	8.4	11.1	30.9	19.7	26.7	8.1	21.4	18.2	7.2	16.8
Resource Planning Capability	11.4	20.5	6.9	23.2	16.0	7.5	36.4	37.8	6.7	21.4	22.0	29.0
Risk Control Capability	9.7	5.3	3.3	5.6	16.6	6.2	2.7	2.3	7.7	2.7	1.3	3.0
Management System Construction Capability	0.4	1.6	0.7	0.5	2.0	2.8	1.4	0.5	11.7	0.9	0.6	0.6

Note: The numbers in the table are percentages.

Procurement positions (1,070 data entries) place the highest emphasis on supply chain management capability and also require a high level of teamwork capability, demand analysis capability, process planning capability, data analysis capability, and resource planning capability.

Product manager positions (1,056 data entries) require a high level of teamwork capability, process planning capability, demand analysis capability, and product development capability, as well as a relatively high level of data analysis capability, competitive product analysis capability, resource planning capability, product lifecycle management capability, and supply chain management capability.

Customer service positions (1,055 data entries) require a relatively high level of demand analysis capability, customer relationship management capability, and teamwork capability.

Customer manager positions (975 data entries) place the highest emphasis on customer relationship management capability and also require a relatively high level of demand analysis capability, teamwork capability, channel management capability, and resource planning capability.

General management positions (1,037 data entries) require a relatively high level of teamwork capability, demand analysis capability, and process planning capability, as well as a certain degree of data analysis capability, product development capability, risk control capability, and resource planning capability.

Service positions (1,042 data entries) require a relatively high level of teamwork capability and demand analysis capability, as well as a certain degree of process planning capability, product development capability, customer relationship management capability, and data analysis capability.

Brand planning positions (1,068 data entries) require a relatively high level of teamwork capability, advertising planning capability, demand analysis capability, and resource planning capability, as well as a certain degree of channel management capability, process planning capability, data analysis capability, product development capability, customer relationship management capability, and competitive product analysis capability.

Channel management positions (1,083 data entries) place the highest emphasis on channel management capability and also require a relatively high level of customer relationship management capability, resource planning capability, demand analysis capability, teamwork capability, and data analysis capability.

Data processing positions (1,043 data entries) require a very high level of data analysis capability, as well as a relatively high level of demand analysis capability and teamwork capability, and also require a certain degree of process planning capability, product development capability, consumer analysis capability, and management system construction capability.

Operations positions (960 data entries) require a relatively high level of data analysis capability, teamwork capability, and demand analysis capability, as well as a certain degree of resource planning capability, channel management capability, process planning capability, advertising planning capability, and product development capability.

Sales positions (1,050 data entries) place the highest emphasis on customer relationship management capability and also require a relatively high level of demand analysis capability, channel management capability, teamwork capability, and resource planning capability.

Comprehensive marketing positions (1,037 data entries) require a relatively high level of demand analysis capability, customer relationship management capability, teamwork capability, channel management capability, and resource planning capability, as well as a certain degree of data analysis capability, advertising planning capability, process planning capability, and product development capability.

As shown in Table 3, the 12 categories of positions have varying emphases on capability requirements. Among the marketing analysis-related capabilities, demand analysis capability is valued by all positions, and data analysis capability is also required by most positions. For marketing-specific function-related capabilities, different positions have different demands. In terms of general management capabilities, teamwork capability is valued by all positions, and process planning and resource planning capabilities are also required by most positions.

5. Optimization of the teaching objectives of the big data intelligent marketing course cluster

Based on the analysis of job competency requirements, the teaching objectives of the Big Data Intelligent Marketing course cluster can be optimized from three dimensions.

First, cultivate marketing analysis capabilities. The course cluster should focus on data-driven approaches and integrate fundamental knowledge of statistics and data science. This will enhance students' abilities to collect, clean, analyze, and interpret big data from

the market. Through case studies and laboratory exercises, students should learn to apply tools such as Python and SQL to conduct intelligent analyses in marketing scenarios, such as demand analysis, competitive product analysis, consumer behavior analysis, and user profiling. They should also learn to provide feasible recommendations.

Secondly, cultivating marketing-specific, function-related capabilities. Students are required to use data tools to solve practical problems by integrating data analysis skills into specific business scenarios, such as customer value analysis, channel performance evaluation, and advertising effectiveness monitoring. This enhances their ability to apply technology in marketing-specific functions, such as product, channel, and customer management.

Thirdly, cultivating general management capabilities. Through project-based and OBE teaching methods that simulate corporate project management and team operations, students naturally develop their teamwork, resource planning, and risk control skills as they complete course projects.

6. Conclusion

This study analyzed online recruitment data to summarize the 12 categories of marketing-related positions and the 16 capabilities required for these positions. Then, it examined the relationship between positions and capabilities. To target job competency requirements, the optimization of the course cluster's teaching objectives unfolds in three dimensions: focusing on data-driven approaches to cultivate marketing analysis-related capabilities; integrating technical tools with marketing business scenarios to cultivate marketing-specific function-related capabilities; and using project-based and OBE teaching to cultivate general management capabilities.

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