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DBSCAN Density Clustering Algorithm Constructed by Marketing Professional Course Cluster - A Study on the Promoting Role of Artificial Intelligence Educational Technology on Teaching Method Reform of Teachers of Higher Vocational Marketing Professionals

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ABSTRACT

Due to the development of advanced information technology such as artificial intelligence, the traditional marketing profession is being transformed and upgraded in the direction of intelligent higher vocational marketing, and the requirements of marketing positions on the knowledge, quality and ability of practitioners have changed. The article analyzes students' cell phone online behavior in different classrooms based on DBSCAN clustering algorithm by collecting students' campus network usage data, according to which the results can provide an effective basis for school management. By introducing the Interpretive Structural Model (ISM) and analyzing the interrelationships between courses, the article proposes a course cluster division scheme for marketing majors, which provides methodological support for the division of clusters in the construction of course clusters for professional teachers, as well as the selection and organization of the courses within the clusters. Finally, investigate the differential judgment of students from different places of origin about the influence of teaching environment, teacher quality, teaching process, teaching tools and resources on the teaching effect of marketing courses, the data show that the influence factors of marketing course teaching have obvious differences in the influence of the teaching effect of the course, improve the ability of professional teachers to educate people, optimize the teaching process of the marketing course, and deepen the reform of classroom teaching.

Keywords: dbscan algorithm, ISM model, marketing, teaching reform

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1. Introduction

In recent years, with the rapid development of artificial intelligence, the field of education has become one of the important application areas of artificial intelligence [1-2]. The rapid development of a new generation of information technology represented by AI will have a revolutionary impact on the traditional education concept, education system and teaching mode, thus further releasing the huge potential of education in the process of promoting the development of human society [3-5]. It is an important mission of education to grasp the global development trend of AI, identify breakthroughs and main directions, and cultivate a large number of high-end AI talents with innovative ability and cooperative spirit. As a market-oriented profession, marketing is always in the wave of constant change [6-8].

The marketing profession is a very strong application, and professional students should have a solid foundation of marketing theoretical knowledge, but also be able to apply the theoretical knowledge to practice and solve practical problems in the marketing field, in order to become applied marketing talents [9-11]. In order to achieve the purpose of marketing professional training, the teaching of marketing professional must be a combination of theory and practice, and the combination of online and offline blended teaching with artificial intelligence can complete the AI context creation of online learning, can complete the objective evaluation of the students' classroom performance, so that the blended teaching content is richer, the evaluation is more comprehensive, and the teaching effect is stronger [12-14].

From the popularization of the Internet to the development of online education, the process of educational intelligence has accelerated [15]. In the future, the integration of artificial intelligence technology into school education has become a trend, and the application of artificial intelligence education makes the content of educational resources richer and the teaching method more flexible, and artificial intelligence can bring innovative modes and methods to professional education, and can promote better development of vocational education [16-18]. The development of artificial intelligence technology in the blended teaching of marketing majors can promote the improvement of marketing professional technology and promote the cultivation of marketing professionals [19].

The issue of talent cultivation has long been one of the most concerned issues in colleges and universities, and it is crucial for improving the quality of education, solving a series of problems such as employment [20]. Therefore, the study of talent cultivation mode based on artificial intelligence has certain practical significance, which helps to enrich the relevant theories of talent cultivation in colleges and universities, and provides theoretical basis for talent transformation [21-22].

Literature [23] describes the personalized empowerment of artificial intelligence technology in the field of marketing, and digs deeper into the value potential of artificial intelligence technology in marketing education. Literature [24] reveals the innovation and changes brought by virtual reality, cloud computing and other AI technologies in promoting the training of marketing talents, and cultivating the artificial intelligence literacy of marketing talents, which helps to develop the international vision of marketing talents. Literature [25] introduces the concept and application cases of generative artificial intelligence such as ChatGPT, focusing on the analysis of artificial intelligence applications and research paths in the field of marketing, which makes a positive contribution to the construction of intelligence and informationization of marketing. Literature [26] designed a marketing training and teaching model based on intelligent software, and carried out simulation teaching and simulation experiments to verify the feasibility. Literature [27] combined with literature analysis methods to study and reflect on intelligent education in order to summarize the shortcomings, advantages and the underlying logic of the operation of the intelligent teaching mode, and discussed in detail with the intelligent marketing course as a case study.

Through the collected data of students' campus network behavior, DBSCAN clustering algorithm was applied in the analysis of students' behavior, mining and analyzing the cell phone Internet traffic

in the classroom of marketing majors, analyzing the students' seriousness to the course, and proposing corresponding teaching decisions for student management. By introducing the explanatory structure model (ISM), the interrelationships between courses are analyzed, and the division scheme of professional course clusters is proposed. Finally, in order to explore the differences in the influence of the teaching factors of the marketing course on the teaching effect of the course, the differences in the influence of the teaching environment, the teacher's quality, the teaching process, and the teaching tools and resources are judged to be the influence of the teaching effect of the marketing course.

2. Clustering of course clusters for marketing majors based on DBSCAN and ISM

2.1. DBSCAN-based clustering of specialized course clusters

2.1.1. DBSCAN algorithm. The basic idea of the DBSCAN algorithm is to first select a data point as a starting point and calculate the density of all points in its neighborhood [28]. If the density is greater than or equal to a predefined threshold, then the point is a core point; if the density is less than that threshold, then the point is a noise point. For each core point, a neighborhood radius eps is used to calculate the density of all points within the neighborhood. If the density is greater than or equal to this threshold, then these points can form a cluster. For each boundary point, if it is within the neighborhood of a core point, then it can be grouped into the cluster where that core point is located. If it is not within the neighborhood of any of the core points, then it is a noise point. Ultimately, all the data points that are categorized into clusters are the clustering results and all the noise points are the noise results.

1) Definitions related to DBSCAN algorithm:

Definition 1: Eps Neighborhood: any data object p that is in a space centered on it and with a radius of Eps the data object that is inside the space is called the neighborhood object of the point p with the formula:

$$N_{Eps}(p)=\{q\in D \mid Dist(p,q)\le Eps\} \tag{1}$$

where $Dist(p,q)$ represents the meaning of the distance from the data object p to the data object q.

Definition 2: Core and Boundary Points: for any data object p, a $MinPts$ threshold is set, and if $\left|N_{Eps}(p)\right|\ge MinPts$, i.e., the number of sets of data objects in the neighborhood of data object p is greater than or equal to the given $MinPts$ threshold, then it is called p a core point; and if the number of sets of data objects in the neighborhood of data object p is less than the given $MinPts$ threshold and is in the neighborhood of the other data objects, then it is called p a boundary point.

Definition 3: Direct density reachability: an object p is said to be directly reachable from an object q density if p is in the Eps-neighborhood of a point q, i.e., $p\in N_{Eps}(q)$, and the object q is a core point, i.e., $\left|N_{Eps}(p)\right|\ge MinPts$.

Definition 4: Density reachable: given a dataset D, an object p_n is said to be density reachable from an object p_1 when there exists an object $p_1,p_2,\cdots,p_n\in D$, for $p_i\in D(0<i<n)$, if p_{i+1} is density direct from object p_i. Density reachable is asymmetric.

Definition 5: Density connected: If there exists object $p\in D$ such that objects p and q are density reachable from object r, then objects p and q are said to be density connected. Density connectedness is symmetric.

Definition 6: Cluster and Noise: Starting from any core point object, all the objects reachable from the density of that object constitute a cluster, and objects not belonging to any cluster are noise.

2) Selection of parameters for DBSCAN algorithm. The DBSCAN algorithm has two parameters, the neighborhood radius Eps and the minimum number of samples $MinPts$. If the value of Eps is too small, it may result in multiple clusters being merged into a single large cluster, and if the value of Eps is too large, noisy points may be grouped into clusters, which reduces the accuracy of the clustering.

The appropriate value of Eps can usually be determined by visualizing the data distribution and observing the distribution of clusters. If the value of $MinPts$ is too small, it may result in more noise points, and if the value of $MinPts$ is too large, it may divide data points that should otherwise be grouped into one cluster into multiple smaller clusters. The optimal value can usually be determined by experimenting with different $MinPts$ values and comparing the quality of the clustering results.

2.1.2. DBSCAN algorithm flow. The step-by-step flow of the DBSCAN algorithm is as follows:
1) Select an unvisited data point p as a starting point, mark it as visited, and add all of its neighboring points with up to reachable density to a set.
2) For each data point q in the set, compute the densities of all points in its neighborhood and add the points with densities greater than or equal to a threshold to the set. If q is a core point, add all points in its neighborhood to the set. If q is a boundary point, add only the points within its neighborhood whose density is greater than or equal to the threshold.
3) Repeat step 2) until all data points in the set have been visited.
4) For each data point that has not been visited, mark it as a noise point if it is not included in any set. Otherwise, it is categorized in the same cluster as the set in which it is contained.

The concept of the density formula Density is given below: this parameter is defined as having some circle with a radius of Eps parameter within which $MinPts$ points exist. The formula is shown below:

$$Density = \frac{MinPts}{\pi \times Eps^2} \tag{2}$$

If the value of Density parameter is larger, the clustering effect is worse, and if the value is smaller, the clustering effect is better.

2.1.3. Clustering of course clusters for marketing majors. The data for the study came from the billing database of the wireless network on the high school campus, where logs of daily usage by students or teachers were recorded.

The environment for the experiments uses the Python machine learning scientific computing library Scikit learn, or sklearn for short. By obtaining information on the internet access of 127 students in four classes of marketing majors in the months of October-November when the students were taking their major courses. The data of students' online behaviors during classes were analyzed in three professional courses, namely, Fundamentals of Marketing, Consumer Behavior Analysis, and Market Research and Forecasting, respectively. In order to be objective and fair according to the actual class attendance to remove the data of absentee students, the analysis is carried out through the algorithm of DBSCAN. The results of the data statistics are shown in Figure 1, Figure 2 and Figure 3.

Observation of Figure 1-Figure 3 can be seen that students study “Fundamentals of Marketing” most of the students use cell phone hours and traffic total is much higher than the other two courses, it can be found that students are not very interested in “Fundamentals of Marketing”. Comparison of Figure 3 with Figures 2 and 1 reveals that students listen to the lectures much more attentively than the two courses of Marketing Fundamentals and Consumer Behavior Analysis when studying Market Research and Forecasting, and it can be found that cell phone use is more seriously polarized.

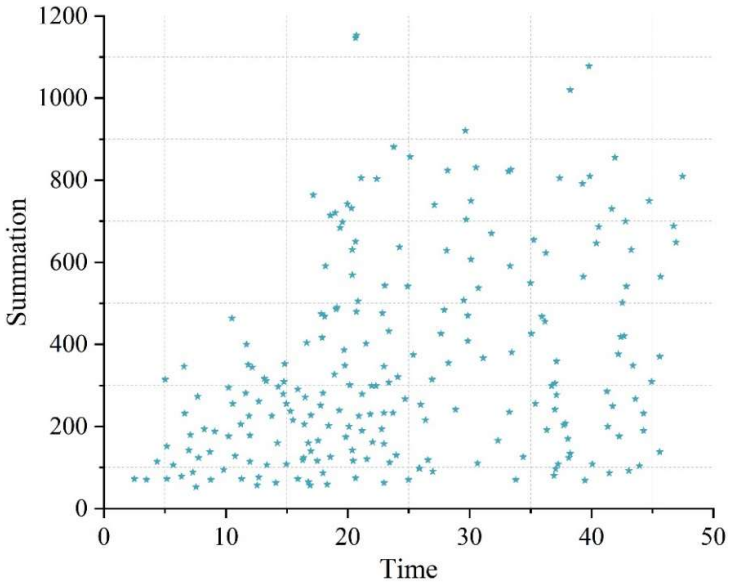

Fig. 1. The market marketing foundation course students surf the Internet

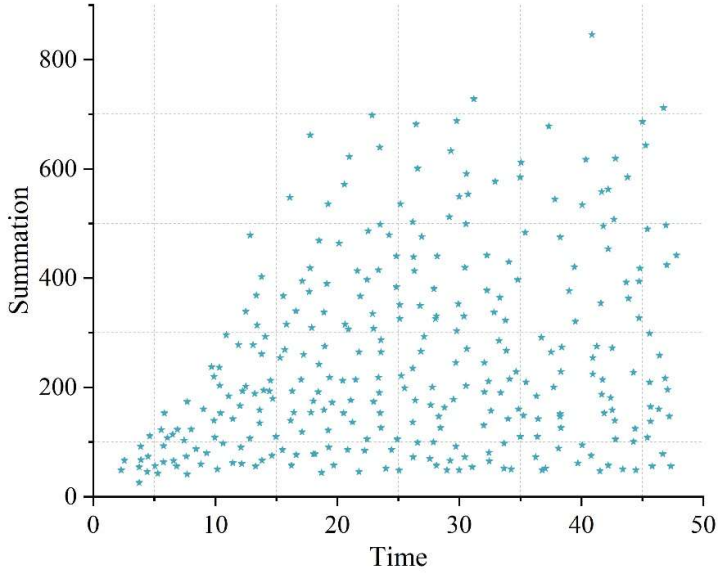

Fig. 2. "Consumer Behavior Analysis" course students online traffic

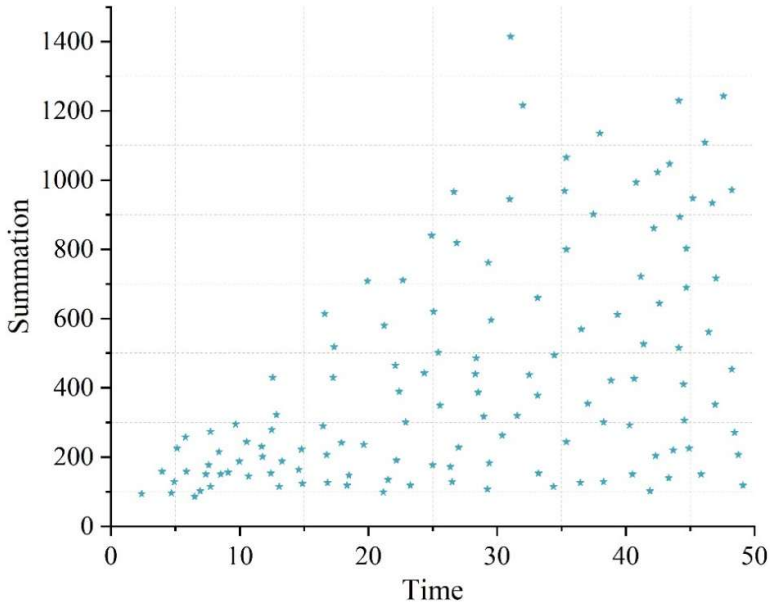

Fig. 3. The Market Research and Forecast course of student online traffic

2.2. ISM-based course construction algorithm

After the above DBSCAN density clustering algorithm clusters the marketing professional course clusters, the ISM algorithm is utilized to improve the marketing professional course clusters, which provides the direction for the promotion of the reform of the teaching methods of the teachers of the higher vocational marketing profession.

2.2.1. Explanatory Structural Models. Interpretive Structural Modeling (ISM) method is to decompose a complex element into a number of sub-elements in the case of many elements and complex relationships, and finally construct a multilevel recursive structural model with the help of knowledge, practical experience and electronic computers [29]. ISM can be applied to build structural models whether in the field of energy, engineering project management or quality analysis, etc.

The interpreted structural model can be obtained by manual computation or by corresponding software or programming, such as SPSS software or Matlab programming. The interpreted structural modeling process is shown in Figure 4.

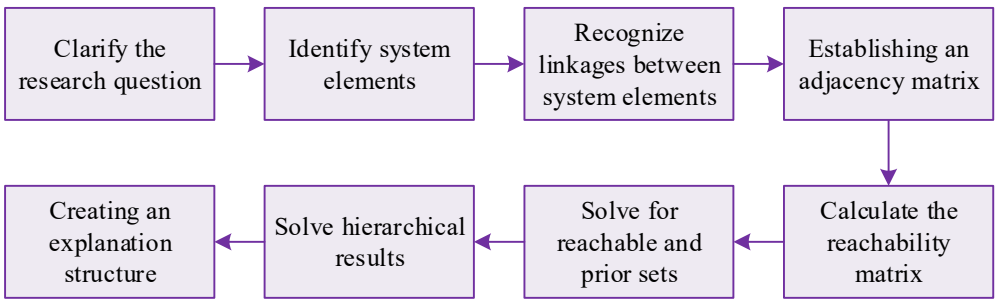

Fig. 4. Interpretation of the structural model flowchart

2.2.2. ISM-based course cluster clustering process:

1) Analyze the structure of the course system of the marketing course cluster to be divided.
2) Summarize and select all the course information in this system to form the element set.
3) Summarize the correlation between each course.
4) According to the correlation of each course, establish the adjacency matrix and solve the

reachability matrix.
5) Perform region division on the reachability matrix. Divide the courses in the same region into a course cluster.
6) Analyze the courses in the course cluster and condense the training objectives of the course cluster.

2.3. Example analysis of ISM-based marketing professional curriculum construction

2.3.1. Problem setting. The marketing module consists of 19 courses, which are numbered here according to the sequence in which they are offered in the training program, and the curriculum of the marketing module is shown in Table 1.

Table 1. Marketing professional module curriculum setting

Numbering	Courses	Numbering	Courses
1	Basic economics	11	Management foundation
2	Marketing base	12	Business etiquette and communication
3	The large number is based on the financial management	13	Customer relationship management
4	Consumer behavior analysis	14	Distribution channel management
5	Sales and management	15	Modern marketing technology
6	Brand planning and promotion	16	Fiscal and taxation
7	Business data analysis and application	17	Advertising theory and practice
8	International marketing	18	Pricing management
9	Market survey and prediction	19	Promotion management
10	Statistical basis		

2.3.2. Creating the adjacency matrix AAs there are more or less links between the specialized module courses, if they are all considered, there will be full connectivity between the courses, complicating the problem and making it impossible to divide the course clusters. Therefore, only the articulation relationship between courses is considered here, i.e., which course needs to be explained before a certain course is taught, otherwise it will affect the understanding of that course. According to this principle, the interrelationships between these 19 courses can be represented by an adjacency matrix, with 0 indicating no relationship and 1 indicating a relationship, as shown in Table 2.

Table 2. Adjacency matrix A

0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

2.3.3. Solving the reachable matrix M. If $(A+I)^r = (A+I)^{r+1}$, then $M = (A+I)^r$. Using the above method M can be found as shown in Table 3.

Table 3. Matrix M

1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0
0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0
0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
0	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	1	0	0
0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0
0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0
0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1

2.3.4. Regionalization. According to the reachability matrix, find the reachable set $R(i)$, the prior set $A(i)$ of each course, and then find the common set $C(i) = R(i) \cap A(i)$, compare whether the

common set and the prior set are equal to each other, and get the starting element set $B(i)$, and the calculation process is shown in Table 4.

From Table 4, $B(i)=(1,5,10,12,18,19)$, the system is divided according to whether the reachable set of each element in $B(i)$ has a common element or not, and the division result is shown in Table 5.

Table 4. The accessible collection, the first set, and the common set of each node

i	R (i)	A (i)	C (i)
1	(1,6,15)	(1)	1
2	(2,4,6)	(2,5)	2
3	(3,11,12,16)	(3,19)	3
4	(4,6)	(2,4,5)	4
5	(2,4,5,6,7)	(5)	5
6	(6)	(1,2,4,5,6,7)	6
7	(6,7)	(5,7)	7
8	(8,9,16)	(8,19)	8
9	(9)	(8,9)	9
10	(10,11,15,17)	(10)	10
11	(11,15)	(3,10,11,17,18)	11
12	(12,13,14)	(3,12)	12
13	(13,14)	(11,12)	13
14	(14)	(12,13,14)	14
15	(15)	(1,10,11,15,17,18)	15
16	(16)	(3,8,15,19)	16
17	(11,15,17)	(9,17)	17
18	(11,15,18)	(18)	18
19	(3,8,16,19)	(19)	19

Table 5. Regional results

	1	6	11	15	17	18	2	4	5	6	7	12	13	14	3	8	9	16	19
1	1	1		1															
6		1																	
11			1	1															
15			1																
17			1	1	1														
18			1	1		1													
2							1	1		1									
4								1		1									
5							1	1	1	1	1								
6										1									
7										1	1								
12												1	1	1					
13													1	1					
14														1					
3			1									1			1			1	
8																1	1	1	
9																	1		
16																		1	
19															1	1		1	1

2.3.5. Results of course delineation. From the regional division, it can be seen that the 19 courses are divided into four course clusters, and the courses within the clusters are analyzed and named for each course cluster as follows: Marketing Management Course Cluster: Marketing Fundamentals, Sales and Management, International Marketing, Market Research and Forecasting, and Fundamentals of Management. Extracurricular practical training courses: brand planning and promotion, business etiquette and communication, modern sales techniques, advertising theory and practice, promotion management. Basic Financial Management Course Cluster: Fundamentals of Economics, Business Data Analysis and Application, Fundamentals of Statistics, Finance and Taxation, Pricing Management. Communication Marketing Course Cluster: Customer Relationship Management, Distribution Channel Management.

3. The effect of teaching method reform for teachers of senior marketing majors

Based on the students' attendance obtained from the analysis in section 2.1 and the marketing course clusters delineated in section 2.3, it is necessary to consider the differences in the influence of students from different origins (counterparts, general students) on the teaching effectiveness of the marketing course in the three aspects of the teaching environment, teacher quality, teaching process, and teaching tools and resources. The teaching influences of the three aspects are shown in Table 6.

Table 6. Teaching influencing factors index

Primary indicator	Secondary indicator
Teacher quality (A1)	Teacher image(S1)
	Teaching style(S2)
	Teacher attitude(S3)
	Teacher degree(S4)
	Teacher major(S5)
	Teacher character(S6)
	Teaching age(S7)
	Teaching language style(S8)
Teaching process(A2)	Knowledge teaching(W1)
	Job presentation(W2)
	Course test(W3)
	Review(W4)
	Situational teaching(W5)
	Practice in class(W6)
	Smart classroom(W7)
	Flip class(W8)
	Extracurricular practice(W9)
Teaching tools and resources(A3)	Multimedia equipment(Q1)
	Textbook(Q2)
	Reference data(Q3)
	Interactive platform(Q4)
	Course website(Q5)
	Teaching app(Q6)
	Experimental equipment(Q7)

3.1. Differential Analysis of the Impact of Teacher Literacy on the Effectiveness of Course Instruction

The results of the variance of the impact of teacher quality on the effectiveness of teaching the course are shown in Table 7. “The degree of influence of teachers' image on the teaching effectiveness of marketing courses” F-test significance is 0.608, which is greater than 0.05, it can be assumed that the variance of the two groups of data is equal, t-test significance level is less than 0.05, it is considered that for the students, the influence of teachers' teacher's image on the effectiveness of the teaching of marketing courses The difference in the degree of difference is significant. According to the survey data, the mean value of the counterpart students is 7.544, and the mean value of the general students is 6.729, which means that the students attach more importance to the “professional image” presented by the lecturers.

The F-test significance of the influence of lecture style on the teaching effect of marketing courses is 0.005, which is less than 0.05, and it can be assumed that the variance of the two groups of data is unequal, and the t-test significance level is less than 0.05, which is a significant difference, and it is assumed that “the influence of lecture style on the teaching effect of marketing courses” varies among different sources of students. It is concluded that there is a difference in the degree of “the influence of lecturing language style on the teaching effectiveness of marketing course” for students of different origins, and the counterparts attach more importance to the lecturer's language style. This shows that although humor, wit, vividness and image are generally accepted, the influence of language style is significantly greater among the counterparts, which also indicates that “serious, abstract and professional language expression” should also take into account the differences of the teaching audience.

Table 7. Teacher literacy independent sample t test

Inspection category	Test variable	Variance homogeneity hypothesis	t	df	Sig. (Double side)	F	Sig.
Teacher quality	S1	Equalization	4.896	215	0.000	0.269	0.608
		Inequality	4.868	202.341	0.000		
	S2	Equalization	-5.066	215	0.000	0.014	0.913
		Inequality	-5.073	208.154	0.000		
	S3	Equalization	-8.257	215	0.000	0.796	0.376
		Inequality	-8.276	208.529	0.000		
	S4	Equalization	-12.336	215	0.000	1.905	0.171
		Inequality	-12.619	214.639	0.000		
	S5	Equalization	-5.505	215	0.000	1.147	0.289
		Inequality	-5.414	190.641	0.000		
	S6	Equalization	-0.407	215	0.609	0.142	0.711
		Inequality	-0.407	208.273	0.608		
	S7	Equalization	0.861	215	0.455	0.112	0.742
		Inequality	0.857	203.562	0.458		
	S8	Equalization	4.522	215	0.000	8.758	0.005
		Inequality	4.437	186.931	0.000		

3.2. Differential analysis of the impact of the teaching process on the teaching effectiveness of the course

Table 8 shows the results of the difference in the impact of the teacher process on the teaching effectiveness of the course. The significance of the F-test of "knowledge teaching", "course test", "pre-test review", "situational teaching", "in-class practice", "smart classroom", "flipped classroom" and "extracurricular practice" is less than 0.05, and it can be considered that the variance of the two sets of data is not equal, and the significance level of the t-test "knowledge teaching", "course test", "pre-test review", "in-class practice", "smart classroom", "flipped classroom" and "extracurricular practice" are all less than 0.05, indicating that for students from different origins, There are significant differences in the influence of "knowledge teaching", "course test", "pre-test review", "in-class practice", "smart classroom", "flipped classroom" and "extracurricular practice" on the teaching effect of marketing courses. Because for students enrolled in the general college entrance examination, affected by the habits formed by learning in high school, "knowledge teaching" and "homework explanation" have often become the "regular procedures" of daily course learning, and these links also play a significant role in learning.

Table 8. Test of independent sample of teaching process

Inspection category	Test variable	Variance homogeneity hypothesis	t	df	Sig. (Double side)	F	Sig.
Teaching process	W1	Equalization	-17.86	215	0.000	14.273	0.000
		Inequality	-18.705	201.205	0.000		
	W2	Equalization	-9.741	215	0.000	0.062	0.921
		Inequality	-9.82	212.949	0.000		
	W3	Equalization	-6.28	215	0.000	23.672	0.000
		Inequality	-6.063	172.824	0.000		
	W4	Equalization	-2.379	215	0.004	20.782	0.000
		Inequality	-2.28	171.914	0.005		
	W5	Equalization	2.193	215	0.158	13.641	0.002
		Inequality	2.167	189.673	0.167		
	W6	Equalization	9.859	215	0.000	86.215	0.001
		Inequality	9.263	127.892	0.000		
	W7	Equalization	3.314	215	0.014	7.871	0.008
		Inequality	3.264	187.174	0.017		

3.3. Differential Analysis of Teaching Tools and Resources on Teaching Effectiveness

Table 9 shows the results of the differences in the impact of teaching tools and resources on the teaching effectiveness of the course. The significance level of the T-test of "multimedia equipment", "teaching APP" and "experimental equipment" is less than 0.05, and the significance level of the t-test of "multimedia equipment" is 0.175, which is greater than 0.05, indicating that there is no significant difference in the degree of influence of multimedia equipment on the teaching effect of marketing courses for students from different origins. This shows that the use of multimedia equipment for course teaching has become a common phenomenon, and multimedia equipment also plays an important role in daily course teaching. The significance levels of the t-test of "teaching APP" and "experimental equipment" were both less than 0.05, indicating that there were significant differences in the influence of "teaching APP" and "experimental equipment" on the teaching effect of marketing courses for students from different origins.

Table 9. The teaching tool and the independent sample t test

Inspection category	Test variable	Variance homogeneity hypothesis	t	df	Sig. (Double side)	F	Sig.
Teacher tools and resources	Q1	Equalization	1.98	215	0.164	8.621	0.008
		Inequality	1.947	183.264	0.175		
	Q2	Equalization	-6.235	215	0.000	3.451	0.132
		Inequality	-6.198	203.161	0.000		
	Q3	Equalization	-8.801	215	0.000	2.019	0.318
		Inequality	-8.688	196.311	0.000		
	Q4	Equalization	-1.744	215	0.025	1.854	0.194
		Inequality	-1.745	208.311	0.025		
	Q5	Equalization	-3.587	215	0.000	0.106	0.755
		Inequality	-3.58	206.722	0.000		
	Q6	Equalization	-6.722	215	0.609	20.152	0.000
		Inequality	-6.943	213.204	0.608		
	Q7	Equalization	3.274	215	0.008	12.452	0.003
		Inequality	3.209	181.408	0.009		

Combined with the above analysis, it can be seen that most of the indicators for general students and counterparts show differences, indicating that there is a significant difference between students of different origins in the “degree of influence on the teaching effectiveness of marketing courses”, so teachers should improve the quality of teaching to promote the reform of marketing teaching methods.

4. Conclusion

By collecting the Internet traffic data used by students in class and applying the DBSCAN clustering algorithm in the analysis of students' behavior in class, we take marketing students as an example to mine the students' cell phone Internet traffic in class and analyze to get the students' seriousness in different courses. By introducing the explanatory structure model (ISM) and analyzing the interrelationship between courses, the 19 courses of marketing are divided into four course clusters, and the teaching management mode is optimized.

Finally, the differences in the influence of marketing course teaching factors on the teaching effect of the course were analyzed, and through the analysis of the data, it was concluded that the influence of marketing course teaching factors on the teaching effect of the course had obvious differences, so the teachers of higher vocational marketing majors should make improvements to promote the reform of marketing teaching in all aspects.

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