Teaching Reform Mode of Applied Economics in the Era of Big Data

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ABSTRACT. In the era of big data, with the rapid development of society and economy, great changes have taken place in the economic model, which has a great impact on the applied economics of colleges and universities. The teaching of applied economics should keep pace with the times and be close to the changing trend of the times. Based on this, this paper studies the teaching reform mode of Applied Economics in the era of big data. This paper analyzes the teaching reform of Applied Economics in Colleges and universities through the comparative experimental teaching method. The experimental class adopts the experimental teaching method, while the control group adopts the traditional teaching method. After the experiment, the two classes are evaluated by the experiment. The experimental class is in the macro economy The model of case analysis, experiment design, computer experiment teaching and experiment examination class are 9-12 points higher than the control group, so we can see the feasibility and effectiveness of the experimental teaching method demonstrated in this experiment.

KEYWORDS: Big data era, Applied economics, Teaching reform, Economic model

1. Introduction

Under the background of big data era, pure theoretical learning of Applied Economics teaching has been unable to meet the teaching requirements [1-2]. On the one hand, due to the lack of relevant practical experience, students often have doubts about the use of the model, and the final teaching effect is greatly reduced, so they can not meet the basic requirements of undergraduate teaching level [3-4].

In the era of big data, the teaching methods of each subject should be reformed accordingly, so as to adapt to the development of the times, and applied economics is no exception [5-6]. Applied economics is not a social science that can't be experimented in class. Experimental teaching can make college students without practical experience deepen their understanding of economic theory, arouse their interest in learning, and promote the teaching of economics to a higher level [7-8]. Therefore, by arranging a certain amount of macroeconomic model case analysis, experimental design, on-line experimental teaching and experimental examination hours, this paper guides the students' model design ideas, operation and the use of Eviews and SPSS and other quantitative analysis software, organically combines theoretical learning and experimental teaching, and truly improves the students' practical application ability and hands-on operation ability [9-10].

This paper first introduces the ISODATA clustering algorithm in big data, which belongs to the "hard clustering" algorithm. It mainly analyzes the basic teaching data, and can classify each sample in the data set into a certain category. Then, two classes of economics major in a university were tested. This paper discusses the methods of experimental teaching and the contents of this experiment. Through consulting the relevant literature, we can understand the current situation of domestic economics teaching, and then analyze the experimental results.

2. Proposed Method

2.1 Characteristics of Big Data Era

Under the Internet environment, big data has become a prominent phenomenon in the society. The technical advantage of big data is high efficiency, high speed and high accuracy. It can realize the analysis and processing of data information in the shortest time, and obtain the relevant data basis that can reflect the social ideology and the law of value.

Big data has four significant features, namely "4V" for short:

(1) The first is the huge scale of data.

(2) The second is the diversity of data types.

(3) The third is the timeliness.

(4) The fourth is great value.

With the advent of the era of big data, the value of data has been rapidly improved, from the original recording symbols to resources with great expansion value. Data has become a new type of wealth, realizing the real "sustainable use of resources". The era of big data has a profound impact on our life, economic development, national governance and other aspects, but at the same time, we must guard against potential risks such as uncertain data analysis results, information leakage and so on.

2.2 Isodata Clustering Algorithm

ISODATA is improved on the basis of partition based K-means clustering algorithm, which is the basis of ISODATA algorithm. The advantage of ISODATA algorithm is that it can deal with a large number of data, which is relatively scalable and efficient, because its computational complexity is 0.

Suppose a data set (1,2,3..., 30) with 30 samples is given, $k = 5$, $N_{min} = 1$, sigma = 1, $D_{min} = 1$ is specified, and 30 samples are divided into the nearest cluster S_j, we can get

$$D_j = m_i \{\|x - z_1\|, \quad i = 1,2,...Nc\} \tag{1}$$

Where the distance of $\|x - z_1\|$ is the smallest, then $x \in S_i$.

Calculate the standard deviation vector of the sample distance in each cluster:

$$\sigma_J = \left(\sigma_{1j}, \quad \sigma_{2j},..., \quad \sigma_{nj}\right)^T \tag{2}$$

Where the components of a vector are:

$$\sigma_{ij} = \sqrt{\frac{1}{N_j}\sum_{k=1}^{N_J}\left(X_{ik} - Z_{1j}\right)^2} \tag{3}$$

In the formula, $i = 1, 2$, n is the dimension of the sample eigenvector, $j = 1, 2, N$, N_c is the cluster number, N_j is the number of samples in S_j.

It can be seen that the operation efficiency of ISODATA algorithm is the highest on the basis of a large number of data, and the ISODATA algorithm can be used to classify and evaluate the students' performance.

3. Experiments

3.1 Experimental Teaching Methods of Applied Economics

(1) Compilation of experimental teaching materials, experimental reports and experimental outlines

The experimental textbook "macro economic model analysis on computer guidance", which fills in the shortcomings of the original textbook, focuses on guiding students to use Eviews and SPSS and other quantitative analysis software, organically combines theoretical learning and experimental teaching, so as to achieve the purpose of truly improving students' practical application ability and practical operation ability.

(2) Multimedia teaching method of Applied Economics

Through multi-media teaching, students' experimental work is explained, demonstrated, simulated and online corrected. It can be carried out; students can use experimental data and software.

(3) The construction of the network of applied economics experiment teaching platform

Network assisted teaching platform should provide students with software and resources of teaching network, design experiments and discussions, and answer questions in the course.

3.2 Subjects and Contents

In this paper, two classes of economics major 2019 in a university are evaluated. The experimental period is one semester. The experimental class uses the teaching methods described in this paper. The control class uses the traditional teaching methods. After the experiment, the assessment is carried out. The assessment scope includes: case analysis of macroeconomic model, experimental design, computer experiment teaching and experimental examination class.

4. Discussion

4.1 Challenges Brought by Applied Economics Teaching in Big Data Environment

In this paper, the current situation of Economics Teaching in a local university is investigated, and the main problems faced by the teaching of Applied Economics in big data environment are summarized by using ISODATA clustering algorithm. The specific analysis is shown in Figure 1.
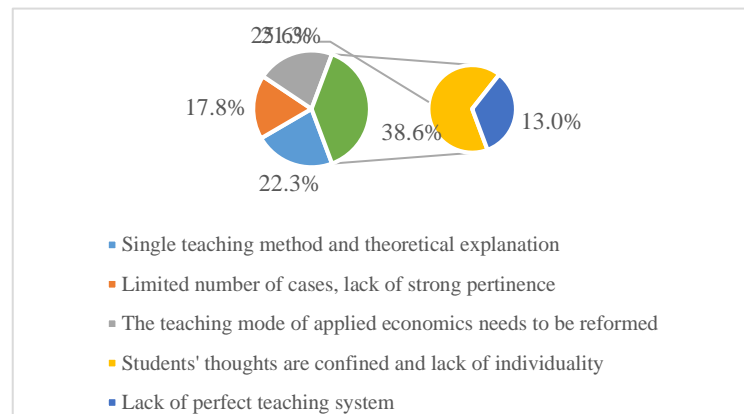

Fig.1 Current Situation of Applied Economics Teaching in Big Data Environment

It can be seen from Figure 1 that the application economics teaching in big data environment faces many problems and challenges, mainly including the following aspects:

(1) The teaching method is single, focusing on theoretical explanation, accounting for 22.3%

In the former teaching mode, many colleges and universities use the teaching mode of teachers to teach students to learn economics. Some schools even develop into teachers reading according to textbooks. Students are not interested in learning at all. Students are in a passive state when learning knowledge. Some excellent students are learning with cases.

(2) The number of cases is limited and lack of strong pertinence, accounting for 17.8%

In the current teaching mode of economics in Colleges and universities, the use of case teaching mode is a common method in the current teaching mode. Compared with the traditional teaching mode, the case teaching mode can promote students' enthusiasm for learning economics.

(3) The teaching mode of applied economics needs to be reformed, accounting for 21.3%

In Colleges and universities, applied economics is a very important subject. When teaching applied economics, teachers should also guide students to think about knowledge points, so as to improve students' independent thinking ability.

(4) Students' thoughts are confined and lack of individuality, accounting for 25.6%

Because the education and teaching in our country has been influenced by the examination oriented education for a long time, many teachers do not consider the students' feelings, nor the teaching effect, but blindly lead the students, which makes the students have low enthusiasm for learning. At the same time, there is a lack of interaction between teachers and students, students do not understand teachers, and teachers do not understand students.

(5) Lack of perfect teaching system, accounting for 13.0%

The development of applied economics needs a perfect teaching system. However, in the process of actual investigation, some schools have set up corresponding applied economics courses, but due to the influence of other economics courses, applied economics is often difficult to carry out smoothly. For example, the proportion of theoretical courses in the distribution of courses is relatively large, while the proportion of practical courses is relatively small.

4.2 Analysis of Experimental Teaching Effect

The experimental course is to let students know that in the modern economy, to avoid risks and make successful decisions depends on the analysis of economic operation and whether a successful economic model can be established. Experimental teaching includes the steps, methods and requirements of modeling. After the experiment, the two classes will be tested, including the case analysis of macroeconomic model, experiment design, computer experiment teaching and experiment examination class. The class average score will be adopted for the assessment, and the ISODATA clustering algorithm will be used for calculation. The results are shown in Table 1 and Figure 2.

Table 1 Statistical Results Of Experimental Items

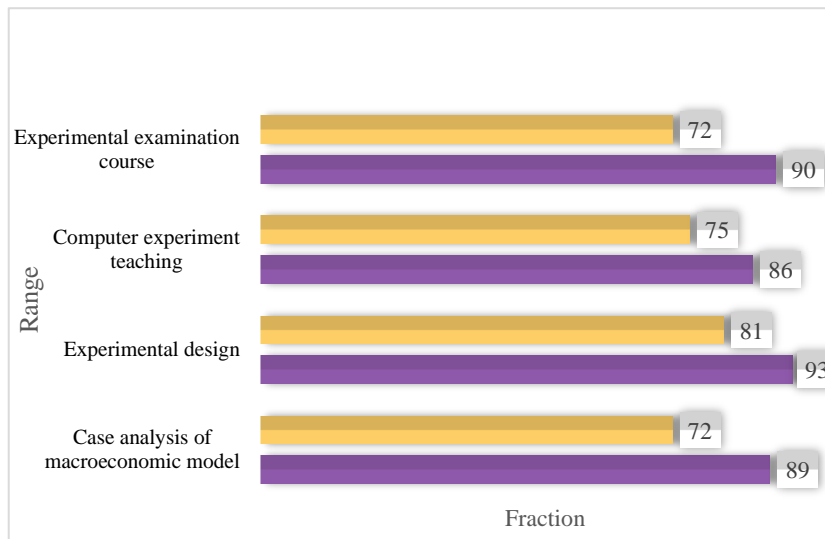| Class	Experimental evaluation content			
	Case analysis of macroeconomic model	Experimental design	Computer experiment teaching	Experimental examination course
Experimental class	89	93	86	90
Control class	72	81	75	72

Fig.2 Statistical Results of Experimental Items

It can be seen from Table 1 and Figure 2 that the performance of the experimental class in the case analysis, experimental design, on-board experimental teaching and experimental examination courses of the macroeconomic model is better than that of the control class. The case analysis score of the experimental class in the macroeconomic model is 89 points, while that of the control class is 72 points. The experimental design score of the experimental class is 12 points higher than that of the control class, and that of the on-board experiment is 12 points higher The experimental class is 86 points in the teaching project, 75 points in the control class, 90 points in the experimental class and 72 points in the control class. Compared with the four projects, the experimental class is 9-12 points higher than the control class, so the feasibility and effectiveness of the experimental teaching method discussed in this experiment can be obtained.

5. Conclusions

In recent years, with the breakthrough development of multimedia information technology and the gradual popularization of Internet and database services, the government and enterprises have widely used these advanced technical means to organize, manage, predict and plan decision-making analysis. The decision-making and management of modern economic subject to economic behavior is quite different from the traditional decision-making and management mode. The difference is that there are more and more factors affecting modern economic behavior. Through experimental teaching, students can master the regularity of macro-economic operation and the uncertainty of decision-making behavior, and improve the ability of national economic management.

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