

Construction of the Three-Dimensional Financial Data Laboratory in the Era of Big Data

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Abstract

With the increase of the amount of information the era of big data is coming. Various data research organization was established to service for business. But which service for colleges is scanty. Education must be reformed to adapt to the social development. To establish their own data Lab is an effective way which combines with enterprise, university and scientific research. This paper analyzes the necessity, structure of the dimension and characteristic to construction of the Three-dimensional financial data laboratory from different perspective. It creates a new way of practical teaching and scientific research.

Key words: Three-dimensional financial data laboratory; Needs analysis; Frame of three dimensions

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INTRODUCTION

We are in the age of various data. Education was absolutely led by teacher in traditional laboratory.

It was restricted to simulation operation. There are many weaknesses such as less information, short of initiative, lack of research support platform and so on. We urgently need the laboratory which can capable of keeping pace with the times. This paper studied why we needed to establish the laboratory, how to build and its characteristics.

With the purpose of servicing the school and strengthen the financial practice teaching. Three-dimensional Financial Data Laboratory satisfactory information extraction, teaching and research. It can improve teaching methods and means, make quality of curriculum and teaching to get a new level.

1. THE NECESSITY OF THREE-DIMENSIONAL FINANCIAL DATA LABORATORY

1.1 The Research Institute of Data Which Services for Colleges Is Scanty

Various data research organizations have been established in the age data. For example, The CAS Research Center On Fictitious Economy & Data Science which focus on the application of economic model and technology research of data, The data research center of Baidu, Ali Research Center, Allen data, Eicke data research center that only provide business services, the Big Data research center which domestic combines with enterprise, university and scientific research and so on, But which service for colleges is scanty. In fact the financial laboratory with exactly analytical reports can reflect the current situation more effectively through collecting and analysis the data of teaching and learning behavior information of students and teachers. It can provide support for seeking solutions.

On the other hand, there have been related to financial laboratories in developed country. Such as the University of Oxford has set up the first big financial data

laboratory—Oxford Nie financial big data laboratory. It donated by Nie Fanqi who is the founder of Hong Kong financial data Technology Co., Ltd. It can analyze data and related behavior of financial markets in the era of big data, more accurate to exploration and utilization of market rules and applied it to the field of finance through combined with technology of big data. Besides hatching a plan of financial innovation workshop will launch in Hong Kong financial data technology Co., Ltd. It will benefit some top universities in Britain, such as University of Oxford, Cambridge University, and Imperial College London. It will launch a platform for simulated trading by mobile Internet. Combined with quantitative trading and big data technology, it can cultivate investment interest and improve the capability of the financial operation.

1.2 Resources Need to Integrate

Resources on the net are total chaos in the era of network release. There are not less than one hundred popular platforms for online teaching in our country. For example, imooc is the maximum platform for IT skills learning. The MOOC College of Shell network is the largest Chinese learning community in the world. School Online was developed by Tsinghua University and it was also an official cooperation platform for MOOC research center of the State Ministry of Education. Open class of Superstar Company and so on. Besides many company supply electronic reading books, such as Sina, Baidu, Superstar, Dangdang, ebook. Online teaching courseware and teaching resources are excessive. They take profit for the purpose. Most universities are out of funding to purchase too many useful resources. They gotta to solve by their own way. To set up their data laboratory is an effective way.

1.3 Research and Classroom Teaching Needs the Three-Dimensional Financial Data Laboratory

More and more courses need to combine theory and practice operation. Such as econometrics needs to do experiment with linear regression model and multiple linear regression model. It demands for statistical analysis per capita consumption of urban residents in China and total consumption functions. Firstly students need to be flexible to use statistical software in order to perform this experiment well. There are three more popular courses of statistical software, Spss, R language and Eviews. Students have an obligation to skilled use the software to do statistical analysis first. Secondly students are able to find macroeconomic data, comprehensive time series data and cross-section data. This requires the corresponding database, virtual trading platform and quantitative trading platform. The model of KMV, VaR and Monte-Carlo will evaluate credit risk in the course of financial risk management. These experiments handled historical stock data and corporate financial data by using Matlab software. So we still need math software. Other courses such as financial accounting, Finance Engineering, operations

research, financial data mining, securities analysis all need to do the experiment in the laboratory. Besides we need C-language software, Excel and Lingo and so on.

At the same time, as a teacher we urgently need a platform which can provide real data for scientific research. Accurate modeling depends on complete data. The research results will affect the securities market and derivatives market in turn. Defective or incomplete data will provide error oriented for government policy decision. While some data cannot be obtained, Research is an effective method to obtain accurate data. However traditional research methods are influenced by space and time. Data is more one-sided and lack of timeliness. At the same time, the amount of data processing is very large. We can greatly reduce the cost of research and shorten the research time if a convenient network research system was established. It can quickly get useful data and integrated survey data. This laboratory can greatly improve the quality and efficiency of work.

2. THE ARCHITECTURE OF THREE-DIMENSIONAL FINANCIAL DATA LABORATORY

Our three-dimensional financial data laboratory meets the requirements of experimental interactive teaching. The laboratory takes the students, teachers, administrators as the main subject. The three dimensional teaching model is constructed by the experiment, management and teaching. The various dimensions interact with each other, common restriction and promotion. Each subject can be complementary to quality integration of human resources and avoid the waste of teacher's preparation. The laboratory also established evaluation system to get the effect of guarantee teaching and management. It greatly improves the efficiency of the assessment management functions.

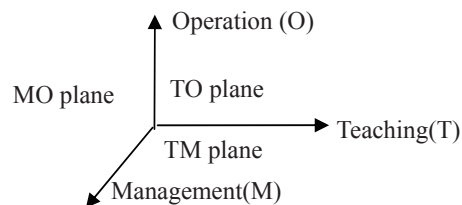


Figure 1
The TMO Space

2.1 The Dimension of Management and Maintenance

This dimension is primarily responsible for integration of course, resource sharing, utilization and effective management. It can solve the problem of data fragmentation and Information Island. Also it should be responsible for lab equipment maintenance and system maintenance to ensure the smooth implementation of the integrated work of the laboratory data. The architecture of this dimension is as follows:

(a) A Laboratory Chief: He must be a professional teacher who is familiar with computer software, hardware and programming. The laboratory chief should do the following work. Such as data integration, management, organization, coordinate, decision making of major issues, and other work. They were regulated by head of the teaching and research section.

(b) Administrators: This position is a part time by teachers who need practical teaching. On the one hand, it can solve the problems in the teaching process. Secondly, they have the right to upload information and change data in the system. They are more authority to update or modify the content. Finally, appointment of part-time administrator can optimize the organization and avoid the waste of human resources.

(c) Data Pattern: It mainly included data sub mode of teacher and student.

a) Data Model of Teacher

The basic information of staff: name, gender, Institute of teaching and research section, title, degree and specialty.

The assessment of information: annual assessment, post assessment.

The situation of scientific research: project, achievements in scientific research, research papers, patents, etc..

Other information: work experience, learning experience, awards and penalties.

b) Data Model of Student

The basic information of students: student ID, name, professional, contact.

Course grades: curricula-variable, score, repair credit.

Other information: study resumes, family situation, awards, personal expertise, community activities, style and entertainment, cultivation of ability, activities of student union.

2.2 The Dimension of Experiment

The application of knowledge cannot be separated from the support of the experiment. We have purchased three professional platform of database which is the competition platform, the CSMAR database, the platform of quantitative investment (Quantrader) from GTA information technology Co., Ltd. The competition

platform can provide or organize the internal and external simulation operation competition. Students can experience the operation of stock and futures market in order to enhance practical ability. The CSMAR database covers the stock market, economic research and money market. Quantrader (QIA) writes code of quantitative investment with the MATLAB language. Standardization strategy is the core of this platform. It can do quick return test, matching verification, high simulation. It has the function of creating strategy, editing documents, checking, equity curve, model modification and so on. The CSMAR database and the Quantrader greatly enhance the level of teachers' scientific research with their real data.

2.3 The Dimension of Teaching

(a) The resource database: It mainly solves data access, integration and archiving of the courseware and review and so on. On the one hand, the database provides support for the teacher in class to maintain the synchronization and consistency of the resources. It is convenient for students to review and check. On the other hand, can find the repetition rate of teaching content and facilitate the data integration by using unified data and related information.

(b) The examination database: It mainly solves unit testing and test by the student themselves. System can be randomly selected test from the trial balloon. The scoring system can give students' scores and ranking after recovery of questionnaires. It effectively improves the availability factor of the test questions. Provide a basis for instructional strategies of decision-making. Meanwhile the function of self-testing can provide convenient for students to review and find problems.

(c) Evaluation of the data platform: As for the evaluation of teaching and management service it adopts the way of mutual evaluation between teacher, administrator and student. It enhances collaboration among various departments. The feedback data was analysis by the unified evaluation standard. It can make management decisions and the improvement of teaching strategy based on the mutual evaluation data.

The structure is shown in the following diagram:

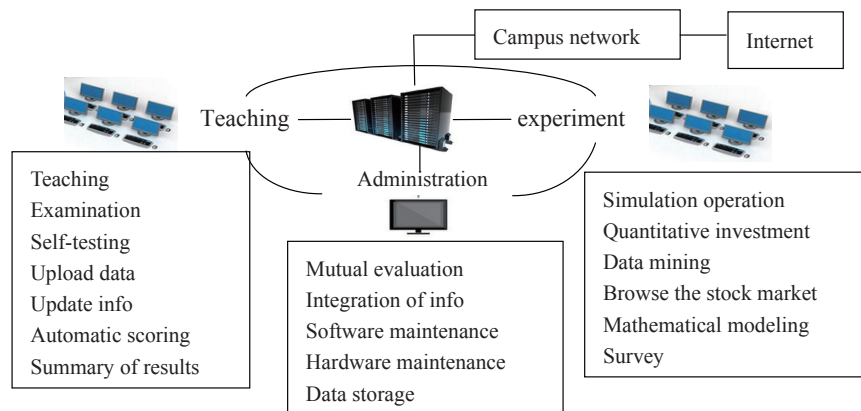


Figure 2
The Data Platform

3. THE CHARACTERISTICS OF THE THREE-DIMENSIONAL FINANCIAL DATA LABORATORY

(a) Characteristics of integrated resources, optimize teaching and improve teaching efficiency. Teaching resources are scattered because of lack of teaching communication. The teacher just arranged according to the teaching material and they did not clear about knowledge of repetition between subjects. This lab can optimize the scattered teaching resources and the low efficiency of teaching effect.

(b) Conducive to mining and analysis data. There are amounts of data among teaching of colleges, administration, the students' employment and business needs. This platform can collect these data, mining data and analysis and forecast data to provide support for teaching.

(c) It is conducive to teachers' scientific research and teaching reform. It helps to change the situation of the lack of objective basis and quantitative criteria for teachers' scientific research. The Three-dimensional financial data laboratory provides high-frequency data and real-time financial information etc. to improve teachers' level of scientific research.

(d) Optimize the management of laboratory. Change to make decision by experience or by likes and dislikes. Culture research and development ability of backstage to change only to develop the students' ability of operate the computer desk.

(e) Cultivate students' ability of theoretical analysis by experimental method, verification and challenge economic theory. The Three-dimensional financial data laboratory

not only meets the conventional teaching but also cultivate talents with social needs.

(f) Change the phenomenon that the assessment lacks the objective basis and the quantitative standard. It has set up an objective and feasible evaluation system.

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