Construction of Leader Training System Based on Internet Technology and Big Data Thinking

Jin Li[1,a], Qingyu Zhao[1,b]

lijin@mi.sgcc.com.cn[a], zhaoqingyu2020@163.com[b]

Party School of State Grid Corporation of China, No. 12 Mangshanlu, Beijing, China[1]

Abstract: With the continuous deepening of the reform of state-owned enterprises, the internal and external environment faced by leaders is facing profound changes, which puts forward higher requirements for the leaders and their education and training. The development of Internet and big data technology has brought new optimization direction to the training work. Based on the research on the leaders of energy based state-owned enterprises, this paper analyzes their needs for the design of training system, explores the feasibility of the application of Internet and big data technology in the leader training of state-owned enterprises, and then puts forward the design concept of the leader training system. Through this system, we can provide more scientific and accurate training services for leaders of state-owned enterprises, meet the requirements of enterprises for leader training, and improve the quality of the leader team of state-owned enterprises.

Keywords: Leader Training, State-Owned Enterprise, System Design, Big Data Thinking.

1 INTRODUCTION

Big data is a product of the rapid development of the Internet era, and a new technology derived from the rapid growth of information. Big data thinking is to grasp the internal law or direction of things' development through massive information collection, storage and analysis, so as to coordinate the various elements and relationships between things to solve the difficulties in development [6]. In recent years, the new generation of information technologies, such as big data and cloud computing, have been rapidly developed and applied. The traditional mode of training is facing challenges in many aspects. The use of network technology and network platform for training plays an increasingly important role in building a team of high-quality and professional leaders and promoting the high-quality development of state-owned enterprises. [1].

The Regulations on Cadre Education and Training also put forward clear requirements for the use of modern information technology in cadre education and training: make full use of modern information technology, improve the network training system, and establish a compatible, open, shared and standardized network training system for cadres; Improve the informatization level of cadre education, training, teaching and management, and make good use of big data, "Internet +" and other technical means [2]. In order to further improve the training quality and cultivate a high-level leader team, it is necessary to build a leader training system based on big data thinking.

This paper summarizes and refines the feasibility and needs of the leader training system construction by investigating the current situation and needs of leader training in energy based

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state-owned enterprises, and puts forward the concept of leader training system construction based on Internet technology and big data thinking.

2 EMPIRICAL ANALYSIS

We conducted a survey on the training status and needs of leaders of an energy based state-owned enterprise. According to the statistical analysis results of the questionnaire data, this paper summarized and refined the status quo of leader training and the needs for the training system.

2.1 Data Collection

The empirical study reported in this paper focuses on leaders of a state-owned enterprise. The data was collected through an online survey conducted in cooperation with the enterprise. Leaders who participated in the training recently were invited to participate in the survey voluntarily. This survey collected data from different departments and the questionnaire was collected in two times. Through the comparison of the results of the two surveys, it can be considered that the sample questionnaire is representative.

We received 202 valid questionnaires. The majority of respondents (89.11%) were men. In terms of age composition, they were mainly over 46 years old, which is consistent with the basic situation of the main leaders of the enterprise (see Figure 1).

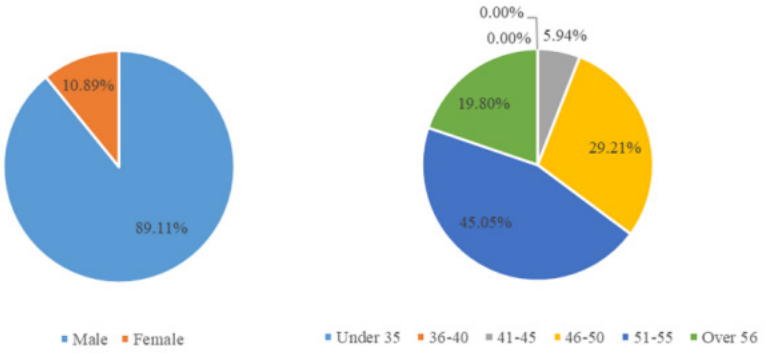

Figure 1. Basic statistical information of the sample.

2.2 Analysis of Research Results

From the overall evaluation of the training, the survey shows that nearly 30% of the leaders believe that the current training system can meet most of their needs, while the rest of the leaders believe that there is still room for improvement in training (see Figure 2), such as improving the pertinence of courses, enriching teaching forms, etc.

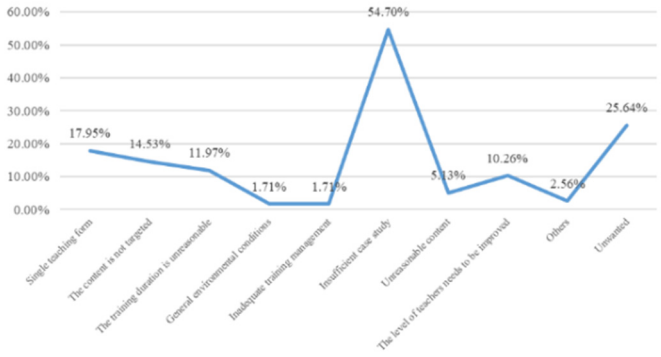

Figure 2. What the leaders think the training needs to be improved.

In terms of curriculum resources, 83.76% of the leaders believe that the current curriculum resources are relatively complete and can help them learn better, but some leaders believe that it is necessary to further enrich the curriculum resources. In terms of teaching methods, the respondents reached a high consensus on their preference for case teaching. 91.45% of the leaders prefer case teaching methods, and more than half of the respondents hope to increase the proportion of case discussion (see Figure 3).

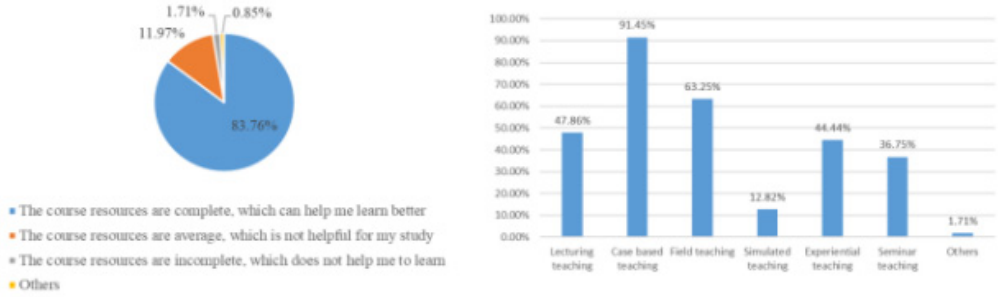

Figure 3. Evaluation of course resources and teaching forms.

In terms of training assistance system, the state-owned enterprise has built an online learning platform. The survey shows that the existing functions of the platform basically meet the needs of most leaders, but the practicality of the course and the richness of information need to be further improved (see Figure 4).

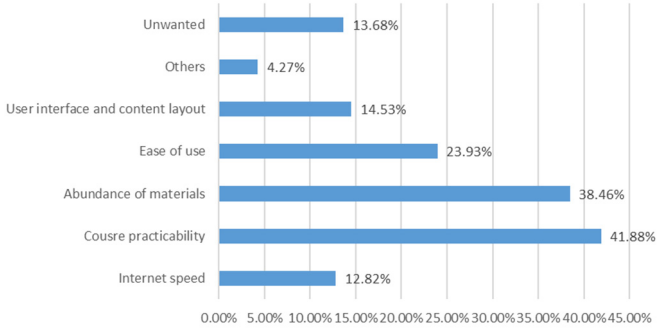

Figure 4. Evaluation of online learning platform.

2.3 Analysis of Deficiency

To sum up, the current leaders of state-owned enterprises have the following deficiencies:

- There is a lack of need research, and the training pertinence needs to be improved. Only by conducting training need research can we obtain comprehensive and accurate training need information, determine training content, and design and implement effective training programs [4]. Some units are mere formality in carrying out need research and ignored the job responsibilities and the needs of leaders, which led to the training content and teaching methods not meeting the needs of leaders well, affecting the pertinence and practicality of training.

- Training resources are scattered and cannot be used effectively. The leader training of state-owned enterprises has formed miscellaneous training data. However, the lack of interaction of training data between different units and departments has led to the ineffective interconnection of information and the ineffective use of training resources, which has affected the richness of resources available to leaders.

- The training program is not accurate enough. The formulation of training program is mainly based on the past experience and the unified arrangement of the superior organization department, ignoring the differences in the needs of different posts and leaders, which led to the homogenization of some training and affect the pertinence and effectiveness of the training.

2.4 Analysis of System Requirements

Based on the deficiency of current training, this paper refines the main requirements of leader training system design as follows:

- Combination of dispatch, participation and training. Through the unified training system, users with different roles can achieve the whole process of "superior organization scheduling training", "participating units arranging leaders to participate in training" and "related institutions conducting training".

- Jointly build and share training resources. In order to maximize the overall resource advantage and avoid duplication and inefficiency of resource construction, it is necessary to establish a model of joint construction and sharing of teaching resources [3]. Training data is an important reference for organization departments and participating units to understand leaders, and training resources are an important basis for training program design. The interconnection

of training data and resources across units can help effectively identify resources that meet training needs and output more accurate and effective training programs.

- Precisely output training program. Precision training is an upgrade of traditional training, which helps to avoid formalism and make training more specific and practical [5]. Through the interaction between different user groups, identify the training needs of organizations, units and leaders, match the needs and resources, and output specific training programs to improve the accuracy of training.

3 CONCEPT OF TRAINING SYSTEM CONSTRUCTION

3.1 Design Idea

The design of the training system relies on the Internet information technology to realize the combination of the Internet and the traditional leader training industry, and complete the economic transformation and upgrading by optimizing the production factors, updating the business system, restructuring the business model and other ways.

By using information technology and B/S architecture, deploy servers in the cloud, manage databases and run back-end code; The front-end graphical interface is realized through the applet side, which is convenient for administrators and users to manage and use.

3.2 Overall System Architecture Design

From the perspective of level oriented design, the system design is divided into the following layers: user layer, application layer, platform layer, storage layer, data layer and support layer. The hierarchical structure is shown in Figure 5.

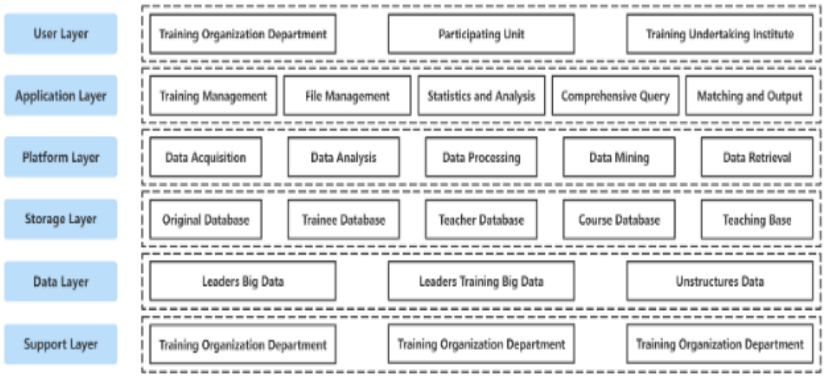

Figure 5. The overall architecture of the leader training system.

3.2.1 User Layer

It provides a unified portal for three types of user groups include training organization departments, training participating units and training undertaking institutes. Each user group can use this portal as an entrance to carry out training organization, training management, and other related work with the help of the system.

3.2.2 Application Layer

Through the use of various service components provided by the platform layer and the underlying business support system, the training management, learning portfolio management, statistical analysis, comprehensive query, match and program output and other functional applications of this construction are realized.

3.2.3 Platform Layer

As the technical support platform of the whole system, the platform layer needs to provide basic services such as data retrieval system, data sharing and exchange system, data analysis system, data processing system, data and resource integration system, data mining system, and data cloud service system.

3.2.4 Storage Layer

The storage layer adopts flexible and efficient information resource collection methods to realize the centralized collection of original data from different organizations, and realizes the classification and warehousing of original data with the help of data processing methods. Through standardized planning and storage, the original database, trainee database, teacher database, teaching base database and training course database are formed.

3.2.5 Data Layer

Standardize and organize data resources to achieve orderly management of data resources and form a leader training big data directory system, including leader big data, training big data and some unstructured data. Among them, leaders' big data captures basic files, learning information, training information and other data of leaders; leaders' training big data captures training resources, training courses, teaching base information and other data; unstructured data covers training related documents, charts, audio and video data.

3.2.6 Support Layer

The support layer includes the standard and specification system, operation and maintenance service system and information security system supporting the stable and safe operation of the system.

3.3 Data Workflow

The leader training of state-owned enterprises will produce a large amount of data, such as historical training information, training needs, training resources, etc. If these data are not processed, counted, classified, analyzed and mined, it is difficult to extract hidden information that can provide support for the development and implementation of training programs, and it will not produce corresponding value.

Effective processing and analysis of data is an important path to achieve accurate matching of resources and needs and improve training quality. With reference to the operation mode of Internet and big data technology, the data workflow of building a leadership training system is shown in Figure 6.

Figure 6. The process of data working of the leader training system.

3.3.1 Data Acquisition

Faced with a large amount of training-related data, including leaders' needs, organizational needs, training information and training resources of units at all levels, how to effectively collect, store and analyse these data is a key issue for the construction of the leader training system.

With the help of preliminary research, collect training needs and resources, teachers' information, teaching bases and other data, while crawling historical training data and trainees' files, then enter them into the original database. Subsequently, the detailed data will be received through each database (see Figure 7).

Figure 7. The databases.

3.3.2 Data Import and Processing

For the training related data from research and crawling history records, there are pictures, tables, documents and data in other forms, which need to be analysed and digitally stored in a structured way while conducting real-time collection. By completing data extraction, data cleaning and conversion, and data loading, the scattered and disparate data collected are integrated together and put into major databases, and the duplicated and redundant information is sifted out.

3.3.3 Data Statistics and Analysis

Through the pre-processing of the data related to the leader training, the original disorganized data can be made convenient for statistics and analysis. The processed training data is further classified and summarized after being filed into each major database.

3.3.4 Data Mining and Application

With the aid of data mining algorithms, a large number of training related data are mined and analyzed to identify the associated data information. The SVM support vector machine algorithm is used to input the different characteristics of each leader, such as age, department, level, training preference, into the established model, and then through parameter optimization,

each person is classified and matched to the most suitable training program for their own, so as to improve the pertinence and accuracy of training.

3.4 User Module Design

The training system provides different functions for different types of users. There are three types of users in this system: training organization departments, training participing units and training undertaking institutes.

3.4.1 Training Organization Department

After logging into the system, the training organization department will enter the organization's demand for leaders training each year, and delineates the categories of training courses and the minimum percentage of each type of course, and then determine the overall training plan. After the participating units and training providers determine and submit the training program, the program will be approved and fed back (see Figure 8).

Figure 8. The sketch map of training organization department module.

3.4.2 Training Undertaking Institute

After logging into the system, the training undertaking institute will enter the basic information of teaching bases and integrate the information of available courses, forms and training periods, maximum training scale, and existing teaching facilities and equipment of the teaching bases. These data will be uploaded to provide reference for matching the training needs of participating units and organization departments. If there is a complete training program, it can also be uploaded (see Figure 9).

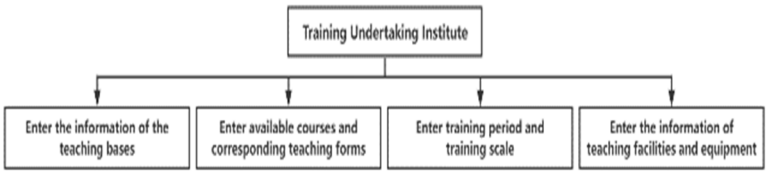

Figure 9. The sketch map of training undertaking institute module.

3.4.3 Training Participating Unit

After logging into the system, participating units can enter the basic information and historical training data of leaders. When formulating training program, select the required course in the system and choose a feasible teaching format according to the course, and then select the training teachers and teaching bases that provide the course and format. Subsequently, the training program will be initially output, which can be adjusted according to the actual situation (see Figure 10).

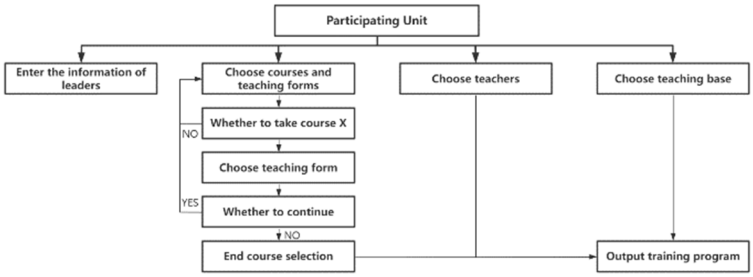

Figure 10. The sketch map of training participating unit module.

3.4.4 Evaluation

The training evaluation module is open to all users, including the evaluation of training courses, training teachers, training arrangements, overall training effects, trainee performance, etc (see Figure 11). After logging into the system, the training undertaking institute will enter the performance during the training period and the final assessment results of leaders for the training organization departments and participating units to view. For the participating units, they can enter the leader's score for the training program and suggestions for improvement; follow up the leader's work performance after the training, and then provide the unit's score for the training program for the training organization departments and training institutions to view.

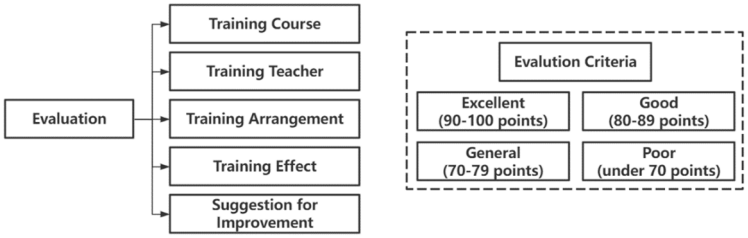

Figure 11. The sketch map of evaluation module.

3.5 System Deployment and Implementation

This system adopts B/S architecture, and realizes the development and operation of the system in the form of WeChat applet. The background code of the system is deployed in the cloud and written in Python language. The interface is encapsulated using Python's own lightweight web framework Flask. The database uses MySQL to store the data required by the background. The front-end code is developed using WeChat developer tools, and the front and rear end interactions are carried out by directly calling the encapsulated interface in the background, so as to realize the operation of each functional module of the whole system.

At present, the system is on trial in the enterprise investigated in this paper. At this stage, data collection and sorting are the main tasks. More than 400 leaders' files have been entered and training resources such as training courses, teachers and teaching bases are gradually entered. In the future, we will further test the system operation effect and develop more functions such as online training, interaction and message board, so that trainees can have discuss with teachers and other trainees, and then better stimulate their enthusiasm and interest in training.

4 CONCLUSIONS

In recent years, the demand for leader education and training in state-owned enterprises has been increasing with the changing situation, which has brought new challenges to the training organization department. Based on this background, this paper explores the application of Internet and big data technology in the leader training of state-owned enterprises, and proposes the design conception of leader training system combining need research, data analysis, resource matching, program output and training management.

Due to space reasons, this paper only proposes the overall construction conception of the leader training system, which can be tested and improved in future research and practice. In addition, the training of other types of employees can also be included in the operation scope of this training system in future practice.

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