

# Design of Labor Education System in Primary and Secondary Schools Based on Big Data

Junhao Zhai, Yunqiu Shi

University of Science and Technology Liaoning, Anshan 114000 China.

**Abstract:** This project discloses a primary and secondary school labor education system, method, electronic equipment and storage medium based on Internet information technology. The system specifically includes: platform management unit, base/institution management unit, school management unit, education department management unit, student parent's management unit and data processing unit. The education methods, electronic equipment and storage medium correspond to the education system. This project is based on Internet information technology and big data technology to carry out labor education for primary and secondary school students. The business interaction and data of the main links in the process of labor education are circulated and promoted in the system, so that the school can master the complete process data. The whole process data system will automatically classify and summarize the students as the main body, and finally form students' labor education files. At the same time, through the construction of the platform, the problems of unbalanced educational resources and low sharing degree of teaching resources such as high-quality lesson plans and labor education bases can be solved, and the sharing of high-quality educational resources can be realized.

**Keywords:** Big data; Primary and secondary schools; Labor; Education system.

## 1. Introduction

In the history of China's education development, labor education is not a new topic, but in the changing times, labor education should be adjusted accordingly. At present, with the rapid development of modern science and technology, human society has entered the information age from the industrialized age, and intelligence, information, creativity and innovation are the basic qualities necessary for workers. Therefore, school labor education should incorporate these requirements of the times, change the one-sided and outdated understanding of labor education, and form a new concept of labor education.

1) Labor education cannot be equated with physical training.

In the past, in a society with underdeveloped science and technology, manual labor occupied the main part of labor. However, with the continuous development of society, the understanding of labor education should also change with the times, and we can't stubbornly equate labor education with physical training.

At present, we are in the information age, which is a highly developed era of science and technology, and automation and intelligence are the distinctive features of this era. Artificial intelligence, computer technology and other high-tech have been widely developed, and there are many labor positions that require less physical strength of workers. In addition, in the information age when the production efficiency is gradually improved, people are gradually liberated from heavy manual labor, and even some daily housework is replaced by intelligent tools. As the fundamental way for workers to exist and achieve transcendence, it is dynamic and developing. With the changes of society, labor will take on new forms to meet the needs of social development. Nowadays, with the development of information technology, information has become an important factor to promote social change and progress. Labor tends to be more intellectual, which requires the participation of information literacy and

creative thinking.

2) Labor education cannot be reduced to teaching people to work busily.

Labor has the meaning of tiredness and busyness, so in the field of education, labor is often misunderstood as busyness and labor. This concept is incorrect. In the information age, artificial intelligence has gradually been widely used in people's production and life, which is a certain degree of liberation for human beings, and people have more leisure time at their disposal. For today's world, the labor form has undergone earth-shaking changes, and the most prominent performance is that information production has become a dominant social labor form. The information age has greatly promoted people's pursuit of freedom. In this case, if we still equate labor education with teaching people to keep working, then labor education is backward.

For a long time, we used to regard labor and leisure as binary opposites, thinking that as long as there is labor, we are in a busy state, not to mention leisure. Actually, in today's background, labor and leisure have their own values. Create unlimited conditions for the acquisition of labor leisure, while leisure injects infinite vitality into labor. Only by creating certain material conditions can leisure life be achieved. Labor provides material foundation for leisure, and leisure provides spiritual assistance for the effective development of labor. In the information age when leisure time is gradually enriched, labor education should not only be regarded as teaching students to work busily, but should focus on leisure education appropriately, so as to promote the free and all-round development of individuals.

3) Implement labor courses in the information field.

In the process of continuous development of information technology, all walks of life, including education, have entered the era of "internet plus", and the implementation of school labor education courses should also reflect the characteristics of this era. We need to build a new model of "internet plus labor education". Under this mode, the content and teaching methods of labor courses have also undergone

revolutionary changes. The traditional labor education in which the professors of labor knowledge and simple skills are dominant has gradually faded away from its original aura. Under the background of "internet plus", the development trend of labor forms is gradually diversified, which puts forward new requirements and challenges to labor education. Therefore, the development of school labor classes should fully develop and utilize information resources, so that the mode of "internet plus labor education" can really work effectively.

## **2. Project content**

The purpose of this project is to provide the design of primary and secondary school labor education system based on big data, so that the participants in each link can use a unified platform system, so that all links in labor education can be circulated and promoted through online and offline combination. Through the release of real-time dynamic text/picture information in the process of labor education, parents' schools can grasp complete process information at any time, and the data in the whole process will be automatically classified and summarized with students as the main body, finally forming students' labor education files.

### **2.1. This project provides the following schemes**

A primary and secondary school labor education system based on Internet information technology specifically comprises a platform management unit, a base/institution management unit, a school management unit, a management unit of an education department, a management unit of students' parents and a data processing unit, wherein, the platform management unit is used for managing the unit modules of the education system; The base/institution management unit is used to create a base/institution in the education system, add, delete, and check the base/institution, and set the authority of the base/institution; School management unit, which is used to manage the schools in the education system; The education department management unit is used to manage the education departments associated with the system; The student management unit is used to provide client services to parents; The data processing unit receives and stores the data, cleans and mines the data, and publishes the analysis results.

### **2.2. Platform snap-in**

The platform course management module is used to add, delete and check the labor education courses in the education system, add, delete and check the curriculum plans of labor education courses, manage the shelves or shelves of products, comment and manage the labor education submitted by students, add, delete and check the labor education teachers related to courses and/or set their permissions, and add, delete and check the classification attributes and parameters of labor education courses; The platform user management module is used for managing registered users in the education system, and the managed content includes student data related to the registered users; The platform student management module is used for statistical summary and display of all the student data in the education system, and the information of statistical summary and display includes: basic information of students, related parent information, school information, participation in labor education information or labor education files; The

education supervisor management module of the platform is used to add, delete, check and/or manage the authority setting of the education supervisor affairs created in the education system.

### **2.3. Base/organization management**

The curriculum management module of the base/institution is used to publish the labor education curriculum information and curriculum plan of the institution, and perform management operations such as adding, deleting, checking, loading and unloading products and submitting them for review; The student management module of the base/institution is used to manage the students enrolled in the labor education courses of the institution, and the management contents specifically include: basic information of students, information of associated users, school information, information of participating in labor education, and labor education files; The registration management module of base/institution: counts and views the online transaction registration generated by the labor education courses released by this institution; Base/institution data management module, which is used to view and manage the data related to labor courses released by this institution; The registration management module of base/institution manages the registration data related to labor education courses issued by this institution.

### **2.4. School management unit**

School basic information management module: manage the organizational structure, school year, grade, class and students of the school; School curriculum management module, which is used to add, delete, check and set up the labor education courses organized by the school; School curriculum management module, which is used to add, delete, check, set and manage the labor education curriculum of different school years, grades and classes, including the labor education curriculum and the labor education teachers of the labor education curriculum, and to evaluate the students after the labor education curriculum is finished; School management module, which manages the existing students in the school, including checking the comprehensive evaluation in students' labor education files.

### **2.5. Administrative unit of education department**

The data center module of the competent department of education is used to manage the data of labor education courses and comprehensive evaluation of labor education of all schools and students in the whole jurisdiction; The curriculum management module of the competent education department is used to check and manage the labor education curriculum issued by all schools in the whole jurisdiction; The curriculum management module of the competent department of education is used to check and manage the labor education curriculum and/or curriculum plans issued by all schools in the whole jurisdiction; The student management module of the education department is used to view and manage all the student data in the whole jurisdiction.

### **2.6. Student Parents Management Unit**

The end student management module is used to add, delete, check and manage registered users; Parent-end student schedule module, which is used to manage the class schedules of related students and the individual schedules generated by

users' self-registration for students, check the details of the courses through the schedules, and complete the synchronization of online learning links related to the courses and offline practice information; The pre-class preview module of labor education is used for online preview of the pre-class audio and video content of students who have participated in labor education courses; The labor education pre-class exercise module is used to submit and view the task exercises of the labor education courses that students have participated in; In the course of labor education, the trip punching module, under which the teacher updates the students' trip status in real time, and the parents check the progress of the students' trip status in real time; The task module in the labor course, under which the teacher updates the students' task completion status in real time, and the parents check the progress of the students' task completion status in real time; The dynamic live broadcast module in the labor education course updates the pictures, audio and video materials of current labor education in real time, and parents can check the progress of students' trip status in real time; After-class homework module of labor education course, which submits and views after-class homework for students who have participated in labor education course after the course is over; The file module of comprehensive evaluation of students' labor education, after students have studied all kinds of labor education courses in the education system, the relevant data are recorded in the file of comprehensive evaluation of students' labor education; The student album module, taking students and courses as dimensions, automatically classifies the pictures and videos generated in the dynamic process of courses related to students into the student album; The student certificate module is used to store the course certificates that students have obtained; The personal data module is used to summarize and display registered users and students, registration information, photo albums, archives and personal information related to registered users.

### 2.7. Data processing unit

Internet data acquisition and storage module: used to send DPI, service side and network element side data to Flume-NG cluster through file interface, and Flume-NG gathers the received data to big data analysis platform in real time through hdfs through memory data transmission mode, and/or used to acquire and record all data generated by users in the learning process, including visiting time, course purchasing time, progress of research sites, task progress under research sites, award distribution, resource retrieval data, guidance and interactive communication data, task achievement data, achievement evaluation data and resource sharing data; Data cleaning module, which cleans and converts the data by writing HQL script to form a feature wide table, cleans and fuses the acquired data, analyzes, mines and processes the data from a large number of data through preset algorithms, and displays them in summary; The data mining module, based on the feature width table, carries out data numerical simulation, model development, model evaluation and model application. The adopted algorithms include Spark R, clustering algorithm and classification algorithm; Analysis and publishing module: store the results of model application in HBase, create a new HBase table in HBase that stores the result set, generate HFile file through Map Reduce, put it in storage through Bulk Load, realize data call through HBase API, and realize data display through ECharts technology.

## 3. There is a comprehensive model of student growth in the education system

The comprehensive model of students' growth includes comprehensive score change model and comprehensive calculation model. Students' evaluation grade model includes labor education curriculum evaluation model, school education curriculum comprehensive evaluation grade model and social education curriculum comprehensive evaluation grade model. In the comprehensive model of student growth: the comprehensive score change model satisfies:

D is the integral change of one dimension in the specified period, and I is in the range of 1-7, which indicates the day of the specified scoring period.  $a_i$  indicates whether there is a quality record of this dimension on that day, if there is, it is 1, and if there is no, it is 0;

Students' comprehensive calculation model satisfies:

$$s = \min((\max(s_l, 700) + d, 1000)$$

S represents the integral of the specified dimension in the current period,  $s_l$  represents the integral of the specified dimension in the last period, and D represents the change of the integral of the specified dimension in the last period. max function indicates that the integral of the previous period is at least 700 points, and min function indicates that the integral of the current period is at most 1000 points.

In the student evaluation grade model:

The evaluation model of labor curriculum satisfies:

S is the student's score in this course,  $a_i$  is the star value obtained by the student under the specified task, and T is the number of tasks;

The calculation method of students' total evaluation grade in this type of course is: the number of different grades obtained by all courses of students' type is multiplied by the corresponding coefficient of this grade to get the scores of all courses of students' type, and the total evaluation grade of students in this type of labor education course can be obtained according to the average scores of courses, meeting the following formula:

S is the total score of students' courses of this type,  $s_i$  is the number of courses with designated evaluation grades, and  $b_i$  is the coefficient of designated evaluation grades; The comprehensive evaluation grade model of school curriculum and the comprehensive evaluation grade model of social education curriculum all meet the following formula:

S is the total score of students' courses of this type,  $s_i$  is the number of courses with designated evaluation grades, and  $b_i$  is the coefficient of designated evaluation grades.

A primary and secondary school labor education method based on Internet information technology specifically includes:

Manage the unit modules in the labor education system of primary and secondary schools through the platform management unit;

Establish bases/institutions in the labor education system of primary and secondary schools;

Add, delete and check bases/institutions, and set the permissions of bases/institutions;

Manage the schools in the education system;

Provide client services to parents;

Receive and store the data, clean and mine the data, and publish the analysis results.

The mobile App is used as a carrier to provide client services to parents.

An electronic device comprises a processor, a communication interface, a memory and a communication bus, wherein the processor, the communication interface and the memory communicate with each other through the communication bus; The memory stores a computer program which, when executed by the processor, causes the processor to perform the steps of the method.

A computer readable storage medium stores a computer program executable by an electronic device, which, when run on the electronic device, causes the electronic device to perform the steps of the method.

#### 4. Specific ways

The primary and secondary school labor education system of this project uses the Internet information data collection and storage module: DPI, business side, network element side and other data to be sent to Flume-NG cluster through file interface, and Flume-NG collects the received data to the big data analysis platform in real time through hdfs through memory data transmission. It is used to obtain and record all data generated by users in the learning process of smart life research courses, including visiting time, course purchase time, progress of research sites, task progress under research sites, reward distribution, resource retrieval data, guidance and interactive communication data, task achievement data, achievement evaluation data, and resource sharing data.

The problem to be solved in this project: in the labor education of universities, primary and secondary schools, a comprehensive platform system is needed for all relevant roles (education authorities, schools, labor education bases/institutions, parents, students, etc.) to complete the collection, statistics, processing, distribution and reception of relevant information, as well as online processing of some labor education links and form data files.

In view of the above problems, the purpose of this project is to provide a set of intelligent labor education management and service platform supported by Internet information technology, centering on the co-construction, sharing, application and resource integration of high-quality practical education resources, and integrating it into the fields of teaching, learning, examination, evaluation and management, so as to achieve the goal of improving the quality and efficiency of labor education and promote the development of labor education reform.

Through combing the labor education and analyzing the actual scene, combining technology research and development and code realization, this project presents and circulates the labor education online through the software system, builds a unified portal management, builds a core database, and builds an open architecture system to build an innovative application mode.

Traditional labor education data information is scattered, and the format is diverse and not uniform, which is not conducive to collection, collation and analysis. This project keeps and records all the data generated in the process of labor education, and forms a labor education file that can be traced and queried. According to the actual needs of the system, this part of data can be synchronously opened to the education authorities through API interface, and a visual data billboard and data screen can be formed, so as to improve the education informatization and provide decision analysis.

In this project, labor education courses are divided into school labor education, social labor education, and family labor education according to the difference between the

initiator, organizer, and delivery party of labor education and the actual situation. Provide functional support according to various types of labor education, build an effective communication platform among home, school, base, institutions and education departments, and realize co-education between home and school.

This project is supported by the data of comprehensive practice evaluation system, which forms a file of students' labor education. Based on all the data generated by students taking courses, the file forms a comprehensive practice evaluation based on courses through algorithms, and the comprehensive evaluation grade of this student under this kind of courses is automatically calculated and output according to the types of courses. Break the traditional teaching mode and realize personality evaluation and precise teaching.

The traditional way of labor education is offline, and the information in the process of labor education is scattered, so schools can't grasp the information of their own students in labor education. This project records the itinerary, tasks, pictures, videos and other information in labor education in the system in real time through the functional support of codes, and synchronizes the information to the parents and schools of students in real time, and monitors the information of students' position and health in real time through the access of intelligent hardware to ensure the safety of the process.

Through the specific application of this project, the following expected purposes will be achieved in the education sector: reducing the management cost of the education sector, completing the data collection ability, improving the students' labor education files, improving the school's labor education ability, supporting the education sector to make accurate decisions, promoting the rapid development of labor education, reducing repeated curriculum development, realizing resource sharing, establishing the image of the labor education platform, constructing the labor education ecological circle, and promoting the overall development of the cause.

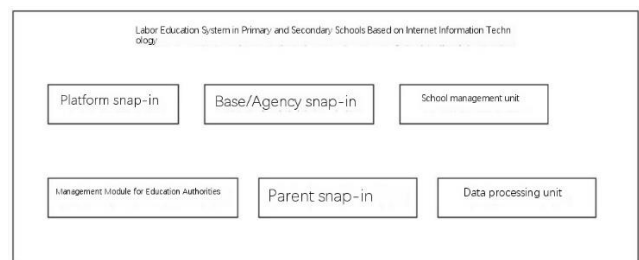


Figure 1. The overall framework of primary and secondary school labor education system

As shown in Figure 1, Embodiment 1 of this project: the labor education system for primary and secondary schools based on Internet information technology, specifically includes: platform management unit, base/institution management unit, school management unit, education department management unit, student parent's management unit, and data processing unit, among which:

The platform management unit is used for managing the unit modules of the education system;

The base/institution management unit is used to create a base/institution in the education system, add, delete, and check the base/institution, and set the authority of the base/institution;

School management unit, which is used to manage the

schools in the education system;

The education department management unit is used to manage the education departments associated with the system;

The student management unit is used to provide client services to parents. In this embodiment, the client services are mobile APP;

The data processing unit receives and stores the data, cleans and mines the data, and publishes the analysis results.

The platform management unit specifically includes:

The platform course management module is used to add, delete and check various types of labor education courses in the education system, add, delete and check the curriculum plans of labor education courses, manage the shelves or shelves of products, comment and manage the labor education submitted by students, add, delete and check the labor education teachers related to courses and/or set their permissions, and add, delete and check the classification attributes and parameters of labor education courses;

The platform user management module is used to manage registered users (mainly parents of students) in the education system, and the management content includes student data related to the registered users;

The platform student management module is used for statistical summary and display of all the student data in the education system, and the information of statistical summary and display includes: basic information of students, related parent information, school information, participation in labor education information or labor education files;

The education supervisor management module of the platform is used to add, delete, check and/or manage the authority setting of the education supervisor affairs created in the education system.

The base/institution management unit includes:

The curriculum management module of the base/institution is used to publish the labor education curriculum information and curriculum plan of the institution, and perform management operations such as adding, deleting, checking, loading and unloading products and submitting them for review;

The student management module of the base/institution is used to manage the students enrolled in the labor education courses of the institution, and the management contents specifically include: basic information of students, information of associated users, school information, information of participating in labor education, and labor education files;

The registration management module of base/institution: counts and views the online transaction registration generated by the labor education courses released by this institution;

Base/institution data management module, which is used to view and manage the data related to labor courses released by this institution;

The registration management module of base/institution manages the registration data related to labor education courses issued by this institution.

The school management unit includes:

School basic information management module: manage the organizational structure, school year, grade, class and students of the school;

School curriculum management module, which is used to add, delete, check and set up the labor education courses organized by the school;

School curriculum management module, which is used to add, delete, check, set and manage the labor education

curriculum of different school years, grades and classes, including the labor education curriculum and the labor education teachers of the labor education curriculum, and to evaluate the students after the labor education curriculum is finished;

School management module, which manages the existing students in the school, including checking the comprehensive evaluation in students' labor education files.

The data processing unit includes:

Internet data acquisition and storage module: used to send DPI, service side and network element side data to Flume-NG cluster through file interface, and Flume-NG gathers the received data to big data analysis platform in real time through hdfs through memory data transmission mode, and/or used to acquire and record all data generated by users in the learning process, Including visiting time, course purchasing time, progress of research sites, task progress under research sites, award distribution, resource retrieval data, guidance and interactive communication data, task achievement data, achievement evaluation data and resource sharing data;

Data cleaning module: cleaning and converting data by writing HQL script to form a feature wide table, cleaning and fusing the acquired data, analyzing, mining and processing data from a large amount of data through preset algorithms, and summarizing and displaying them;

The data mining module, based on the feature width table, carries out data numerical simulation, model development, model evaluation and model application. The adopted algorithms include Spark R, clustering algorithm and classification algorithm;

Analysis and publishing module: store the results of model application in HBase, create a new HBase table in HBase that stores the result set, generate HFile file through Map Reduce, put it in storage through Bulk Load, realize data call through HBase API, and realize data display through ECharts technology.

## 5. Summary

Compared with the prior art, this project has the following advantages: based on Internet information technology and big data technology, the primary and secondary school students are given labor education, and the business interaction and data of the main links in the labor education process are circulated and promoted in the system, which not only enables the education department to view the labor education data, but also enables the school to master the complete process data through the data collection in the course of class, and the whole process data system will automatically classify and summarize the students as the main body, and finally form the students' labor education files. At the same time, through the construction of the platform, the problems of unbalanced educational resources and low sharing degree of teaching resources such as high-quality lesson plans and labor education bases can be solved, and the sharing of high-quality educational resources can be realized.

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