Response System Design of College Students' Education Management with Data Analysis

Qing Li(✉)

Baoshan College, Yunnan Province, Baoshan City 678000, China

Abstract. The research on the design of the response system of College Students' Education Management Based on data analysis has brought impact and pressure. How to actively deal with the negative impact of education management is an urgent task of College Students' education and management. From their own point of view, colleges and universities should establish and improve the service mechanism, democratic participation mechanism, information disclosure mechanism and rapid response mechanism, and actively deal with the adverse effects of student management.

Keywords: Data analysis · University · Student education management · Coping mechanism

1 Introduction

Management system is a complete organization management system composed of various management institutions, management systems, management processes and management methods with specific management functions and internal relations for the management objects to achieve the organizational objectives. In an enterprise, the total system can be divided into planned operation, production technology, labor and personnel, financial costs and life services. There are differences and connections between them. The objective of subsystem should be subject to the general goal of enterprise management system. The functions of each subsystem are not listed in parallel, among which one subsystem plays a leading role in achieving the overall goal. If we consider enterprise management as a system, we can adopt the method of systematic analysis, comprehensively study the professional management of the enterprise, combine the internal conditions of production and operation activities with external environment, quantitative analysis and qualitative analysis organically, and choose the best scheme to improve economic benefits and promote production development. A good management system is shown in Fig. 1.

2 Research on Theory and Technology of Genetic Algorithm

The research of genetic algorithm mainly includes three fields: the theory and technology of genetic algorithm; optimization with genetic algorithm; machine learning of classification system with genetic algorithm. The theoretical and technical research of genetic algorithm mainly includes coding, crossover, mutation, selection and fitness evaluation.

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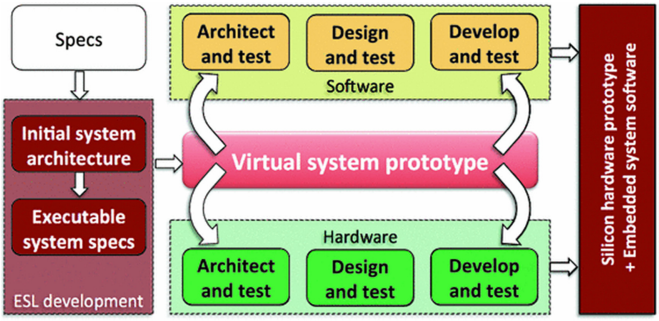

Fig. 1. Basic framework of management system

In many problems solving, coding is the most important problem in genetic algorithm, which has a very important impact on the performance of the algorithm.

1) Binary coding Holland first put forward the most commonly used coding method in genetic algorithm [1]. It adopts the principle of minimum character encoding, which is characterized by simple and easy operation of encoding/decoding, which is conducive to the realization of crossover and mutation operations. It can also use pattern theorem to analyze the algorithm theoretically. However, when binary coding is used in the optimization of multi-dimensional and high-precision numerical problems, it cannot overcome the mapping error of discretization of continuous functions, and cannot directly reflect the inherent structure of the problem, with low precision, large individual length and large memory consumption.
2) Gray code coding in order to overcome the shortcomings of binary code in discretization of continuous function, people put forward the method of coding with gray code, which is a variant of binary code. Suppose there is a binary code $X = x_m x_{m1} \ldots x_2 x_1$, If the gray code of $Y = y_m y_{m1} \ldots y_2 y_1$, then

$$\begin{cases} y_m = x_m \\ y_i = x_i + 1 \oplus x_i \end{cases} i = m-1, m-2, \ldots, 2, 1 \tag{1}$$

The methods of mutation were as follows:

$$v_{zt} = \begin{cases} v_{zt} + (v_{zt} - v_{\max})h(g) \\ v_{zt} + (v_{\min} - v_{zt})h(g) \end{cases} \tag{2}$$

$$h(g) = r_0(1 - g/G_{\max}) \tag{3}$$

3 The Present Situation of Educational Management in Colleges and Universities

3.1 The Management System of Higher Education is not Perfect

The important guarantee to improve the level of educational management in Colleges and universities is the good management system that most colleges and universities have

established. Under the influence of traditional education concept, the relevant management system which cannot meet the development needs of the new era is still in its infancy. The reform of the management system for students who are too rigid and too strict is very slow. The lack of scientific and reasonable management system to stimulate the sense of responsibility and work enthusiasm of university teachers leads to slack work, which is not conducive to the development of education.

3.2 The Content of Higher Education Management is Relatively Backward

As far as the present situation is concerned, the old teaching mode and inflexible method of education in China, which is affected by the backward ideas before, has not considered the students' ideas and teachers' interests in the traditional education management mode and education mode, which has brought certain obstacles to the education management of colleges and Universities, Even under the influence of backward ideas, it wastes a lot of teaching resources under the management system of higher education, which leads to a great reduction in the efficiency of China's higher education management in practice. Because of the traditional teaching concept still deeply existing in people's heart, the education management of colleges and universities hinders the overall development of colleges and universities.

3.3 The Management Mode of Higher Education is Too Monotonous

At present, with the decrease of elective courses and the increase of cultural courses in Colleges and universities, many education methods are still outdated. Many colleges and universities adopt the credit system which cannot unify new knowledge and new information. The implementation of the credit system which lacks the concept of people-oriented leads to the serious phenomenon of fewer subjects in most colleges and universities in China, And at present, the educational management means which cannot reflect the students' situation in our country is too simple. The overall quality of high students affects the development of students to a certain extent [2]. At the same time, it cannot improve the education management of colleges and universities in the next step, and cannot guarantee its scientificity and rationality in the development of education management.

4 The Importance of Reforming and Innovating the Educational Management System in Colleges and Universities

4.1 Conducive to Social Development

With the rapid development of social economy and the reform of education management system, the future promotes the sustainable development of society [3, 4]. In order to improve the overall quality of the society and prevent any bad atmosphere from damaging the rapid development of China, colleges and universities have trained more talents representing China's hope and future, and have the courage to innovate, To provide the society with a continuous stream of talents who undertake this arduous task. The young

strong are the strong in China. In the era of fierce war, countless patriots and talents were trained by colleges and Universities under extremely difficult circumstances. With the power of these people, now there is China. Nowadays, with the development of international competition, there is an urgent need for innovative talents [5, 6].

4.2 It is Conducive to the Development of Education

Under the influence of the old management system with many drawbacks, the reform and innovation of the education management system is stagnant, which cannot give full play to the role that colleges and universities should play in personnel training. The most important task of colleges and universities is to train people. The education management system has no way to deal with the current unbalanced development of college students, which restricts the development of society. In order to promote the development of education in the new situation, we can start from a more fundamental point of view, develop student development plans with students as the main body, so as to cultivate more high-level talents to meet the social needs (see Fig. 2).

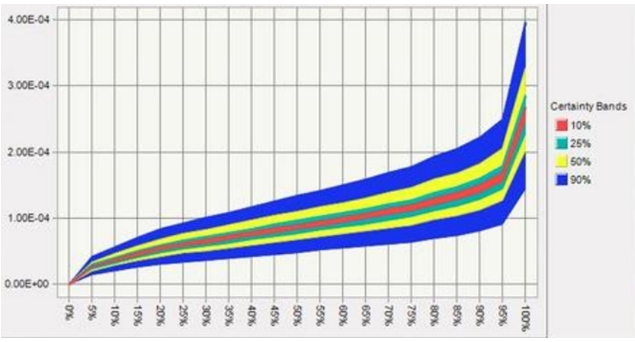

Fig. 2. Effect simulation of manager system

5 The Innovation Strategy of University Education Management Mechanism

5.1 Changing the Concept of Education

In the new situation of classroom teaching, teachers should give full play to students' subjective initiative, actively interact with students, strengthen communication with students according to different students' learning conditions, and formulate teaching programs and reasonable teaching plans suitable for most students' learning conditions [7].

5.2 Innovation Evaluation System

Teachers should have a complete student evaluation system based not only on their academic achievements but also on their social behaviors, not only in their daily work

but also in students' feedback to teachers. The evaluation of students should not only pay attention to their daily behaviors, but also their communication and cooperation with teachers, and explore their interest and potential. Through the evaluation of students, we can better understand the students. Teachers should also have a complete evaluation system based on the students trained by teachers. In order to strengthen the supervision of students, improve the competitiveness of teachers and promote the development of colleges and universities, the evaluation of teachers should be carried out from the aspects of students' examination, daily life, participation in competitions and sports activities [8].

5.3 Innovating the Content of Education Management

In order to promote the effective implementation of university education management, under the condition of educational management mode innovation, the content of university education management should fully consider the development needs of students, meet the needs of talent training and the development needs of the information age, so as to effectively promote the rationality and scientificity of higher education [9]. The content of innovative education management is reflected in many aspects, such as reasonable increase of ideological education courses and ideological education practice courses which can effectively improve students' ideological level, combine students' theoretical knowledge with ideological education practice, improve students' personal quality and comprehensive ability, and effectively promote the development of China's Higher Education Management [10].

6 High-Level System Design

6.1 System R&D Objectives

The expected goal of the system is to take the adult education teaching activities of Civil Engineering College of Jiaying University as the center, take the students as the link, realize the whole process management of educational administration, teaching, assessment and graduation, strengthen the comprehensive inquiry and analysis function through information means, free the educational administration staff from the heavy offline labor, devote themselves to teaching activities, and improve the quality of education [11].

6.2 System Architecture Design Principles

According to the business needs of student information management system, the system architecture design realizes unified architecture technology system, unified business control processing system, unified system maintenance, backup and development management system. The system architecture design follows the principles of data stratification, low coupling, scalability, practicability, reliability, practicability and security [12].

1. Principle of data layered design: the data of the system includes system rules and business application data, which should be classified and stored in different data layers during design. 2. Low coupling layered design principle: in the system architecture

design, under the condition of meeting the system requirements, the low coupling of system design can be achieved by adopting the component design of each functional module, which creates convenient conditions for team members to develop independently and work together, and can greatly provide development efficiency, The whole system will not stagnate due to local obstacles, which greatly reduces the project risk [13]. 3. Expansibility principle: the system must have good expansibility to meet the more requirements of system functions brought by the expansion of business. We can follow the business component modular design principle, factory design pattern to design functional components and add new business processing components to achieve the scalability of the system. 4. Practicality principle: no matter how complex the system logic is, it must be simple and easy to use for users, and try to follow the user's operating habits and business processes. 5. Reliability principle: the system should be reliable, and the application system should be able to describe the abnormal error report in detail, so that the administrator can deal with the problem in time. At the same time, the system should have high fault tolerance ability to meet the robustness requirements of the system [14].

6.3 Application System Structure

Student information management system is a three-tier application software system based on J2EE industrial standard enterprise level distributed technology architecture. The system is developed with Java language. By making full use of the cross platform, extensibility, security and stability, reliable technical functions and features of Java language, the system also realizes a large number of integrated application interfaces, It not only makes the system have strong technical advantages, but also greatly improves the flexibility and expansibility of the system [15].

The system adopts browser/service (B/S) architecture. This architecture greatly reduces the workload of system development and maintenance, and also reduces the difficulty of users. The whole system is divided into three layers of web structure, that is, the system access structure is logically divided into three layers: presentation layer, application service layer (business logic) and data layer. The presentation layer enables users to understand and efficiently locate application services through the implementation of the graphical interface of application services. The application layer between the display layer and the data layer not only encapsulates the application model associated with the system, but also provides the connection between the client application and the data service, thus providing a clear level for the realization of the business logic of the college, and separating the user presentation layer from the database code. At the same time, the application layer also implements the application strategy and encapsulates the application pattern, And present the encapsulated pattern to the client application. The application system structure is shown in Fig. 3.

7 System Detailed Design

Detailed design is the key to realize the functions of the system. It gives the diagram of the software structure of the student information management system, describes each

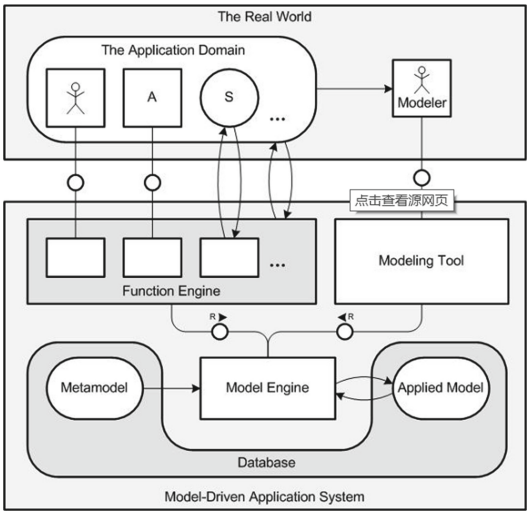

Fig. 3. Application system structure

function module in detail, including algorithm and logic, and is the basis of the implementation and test of the student information management system. The detailed design of the system directly affects the smooth level of the development progress of the system. An excellent detailed design can reduce the occurrence of development iteration and reduce the development time and reduce the development cost; at the same time, the detailed design also gives the development testers a common standard, which is convenient for the development and test of the detailed design of the student information management system from the teaching management needs of the college, The main functions of student management, course selection management and examination management are described [16].

The student management module mainly includes student basic information management, payment rules setting, student status management, inquiry statistics management and other sub functions. Students' basic information management realizes the management of students' basic situation, which is basically static and serves as the basis of College Students' management. At the same time, it can also be updated with the occurrence of some events, such as the adjustment of students' majors, so the professional attributes can be updated. The setting of payment rules realizes the setting and management function of students' payment rules, which serves as the basis for students to collect fees from enrollment to graduation. Student status management mainly realizes the functions of student status change management, specialty transfer management and student status information audit. When a student's status changes, such as graduation or withdrawal, such information will be recorded and saved. Inquiry statistics is mainly to realize the student-centered, comprehensive query of students' various information, and statistical analysis by category. Server security refers to the server security reinforcement and configuration with the operating system as the core. It is the most basic

requirement of server security. Doing well in server security, ensuring the stable operation of the server, enhancing the anti attack ability, and configuring the audit function are the necessary measures for security forensics [17].

8 Database Design

Database design is the basis of the realization of student information management system. The quality of database design determines the success or failure of the realization of student information management. Therefore, in the process of database design, designers should make full use of the principles, standards and norms of database design in order to achieve good design results. Database design is the core work in the development and construction of information system. Through database design, the physical design model of database can be obtained. In the process of database design, not only to support the excellent performance of related programs, but also due to the complexity of the database application system itself, these factors lead to the database design has become a very complex work. Since the database design has the characteristics of great difficulty and long time, it is impossible to get the best design results overnight. Designers can only get better and better design results in the process of planning and structuring the data objects in the database and the relationship between these data objects. Database design includes conceptual structure design stage, logical structure design stage and physical structure design stage.

9 Conclusion

The innovation and development of education mode and teaching quality, since the reform and opening up of new China, has been under the background of the integration of education mode. In order to better develop and cultivate high-quality talents and cultivate better talents for the society, higher education management has to adhere to the road of innovation. As an important part of China's colleges and universities, it has an urgent demand for the standardization, standardization and informatization of teaching management, which is not only the need of its own management, but also the need of many students. Based on the in-depth discussion of the urgent need of adult education of civil engineering in Jiaying University Based on teaching management information, according to the theory of software engineering, this paper analyzes and designs the student information management system, including the system requirements analysis, the main technology of application, the system outline design, the detailed design of the main functions of the system, and the database design. The design goal of this system is to realize the informatization and intellectualization of student management, teaching management and educational administration management, and improve the level of adult education management.

References

1. Xue, X.: Research on coping mechanism of College Students' Education Management under the new media environment. Ind. Innov. Res. **20**, 185–186 (2020)

2. Wei, W.: On the coping mechanism of College Students' Education Management under the new media environment. Int. Public Relat. **06**, 35–37 (2020)
3. Jiang, L.: Analysis on the transformation of College Students' education management mode in the era of big data and Discussion on coping strategies. Ind. Sci. Technol. Innov. **2**(03), 95–96 (2020)
4. Qingbiao, X., Jun, L.: Research on the education and management mechanism of college student party members in the new era — from the perspective of "thinking, speaking and doing". Youth (09), 200 + 199 (2019)
5. Yichun, Z., Yuxi, W.: The current situation of information teaching ability of higher vocational teachers and Its Improvement Countermeasures – Based on the survey of 74 Higher Vocational Colleges in Jiangsu Province. Vocat. Techn. Educ. **36**(36), 70–75 (2015)
6. Yun, P.: The development of adult education under the concept of Lifelong Education. Sci. Educ. Wenhui. **3**, 102–103 (2017)
7. Yun, T.: Research on the deep integration of entrepreneurship education and lifelong education. Chizi. **3**, 108–109 (2017)
8. Nanguonong: New stage and new mission of China's education informatization development. Audio Visual Educ. Res. (12), 10–12 (2011)
9. Youju, Q., Xuesong, Y., Yi, L.: Construction of lifelong education system under the environment of modern information technology. J. Dist. Educ. **28**(05), 79–83 (2010)
10. Ding Shaoliang, X., et al.: Construction and practice of multimedia network teaching mode in Higher Vocational Education. J. Jiangxi Police Coll. **01**, 125–212 (2008)
11. Xiaohua, L.: UML Foundation and VI isio Modeling. Electronic Industry Press, Beijing (2004)
12. Ning, W.X., Ping, W.X.: JSP General Module and Typical System Development Example Navigation. People's Posts and Telecommunications Press, Beijing (2006)
13. Peixin, Q., et al.: Essence of Java Project Development Case. Electronic Industry Press, Beijing (2010)
14. [American] Brown, S., et al.: JSP Programming Guide, 3rd edn. Electronic Industry Press, Beijing (2004)
15. Yuhui, F.: SL Basic Course. People's Posts and Telecommunications Publishing House, Beijing (2009)
16. Chun, S.K.: Selected Examples of JSP Information System Development. China Machine Press, Beijing (2006)
17. Jin, L.: Research and Development of Integrated Educational Administration System for Adult Education. Shandong University of science and technology, Qingdao (2005)