

# ***Optimization and Information System Design of Undergraduate Primary Education Major Curriculum System Based on Big Data***

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**Abstract:** The 21st century is an era of rapid evolution of knowledge and information economy. The competition for student employment and recruitment of international talents is becoming more and more intense. The relevant report clearly stated that ordinary secondary schools and other higher education institutions that undertake the task of cultivating basic education teachers need to adjust their training objectives, career arrangements, curriculum structure and teaching methods according to the specific goals and content of the basic education curriculum reform. The change. Primary school physical education courses are of vital importance for improving the quality of talent training. Only in accordance with the long-term and short-term needs of my country's economic and social development for talents, and continuous improvement of the education system and information system, can we truly promote the development of students and improve the level of talent training. Based on big data, this paper studies the optimization of the undergraduate primary education major curriculum system and the design of the information system. First, the literature research method is used to explain the existing problems of the undergraduate primary education major curriculum system and the optimization measures of the college undergraduate primary education major curriculum system. , According to the existing problems in the design of the information system, as well as the detection experiment after the system is realized, the experimental results, a total of 9 problems were found in the test process, including 1 serious functional defect, minor defects but not affecting the normal function of the system There are 2 deficiencies, 2 browser compatibility issues, 2 suggested issues about the convenience of the system, and 3 issues where the system display does not meet the expectations of users.

## 1. Introductions

The undergraduate education of universities is an important cradle for cultivating outstanding teachers in the future, and it undertakes the arduous mission of cultivating a group of high-level primary education, large-scale digital education and large-scale digital teaching [1-2]. Whether its educational system is reasonable or not will directly affect the comprehensive quality of our country's primary school system education teachers and the development of our country's primary school system education [3-4]. However, in practical teaching, the education system at the lower elementary level of undergraduate education has problems such as unbalanced knowledge structure, excessive emphasis on knowledge transfer, restrictions on curriculum content, and beyond the range that students can bear [5-6]. With the gradual deepening of my country's economic and social development and the reform of the education system, the problems existing in the learning system of undergraduates majoring in basic education in ordinary universities have become increasingly prominent [7-8]. Only according to the society's long-term and long-term needs for talents, and according to the development needs of students, continuously optimize the learning system, and improve the skills and tolerance of ordinary students, can we cultivate a new type of faculty and talents for the needs of the 21st century society[9- 10].

In the research on the optimization of the undergraduate primary education major curriculum system in colleges and universities, many related studies have achieved good results. For example, in terms of the major characteristics of primary education in universities, the major of primary education has three characteristics: First, the essence of quality lies in education. The basic education undergraduate course is a teacher training program, mainly used to train talents participating in education. Second, the direction is in elementary school. The primary education curriculum is to train primary school teachers. Finally, the significance of the undergraduate primary education major. Educate and cultivate talents with degrees. Therefore, a more comprehensive and popular summary is made on the characteristics of primary education majors [11]. Undergraduate primary school majors must have key characteristics, such as social ecology, disciplinary diversity, comprehensive knowledge, reasonable structure and development, and innovation. Social ecology means that the curriculum must return to nature, society and human life; the diversity of disciplines means that the curriculum must include the integration of nature, society, humanities and other disciplines. Structural rationalization refers to the optimization and rationalization of the multi-dimensional structural model of the curriculum. One dimension includes general courses, vocational courses, subject courses, and required and elective courses. Two-dimensional is divided into basic cultural courses, practical courses and activity courses. 3D refers to teacher skill training courses and student professional courses. Four-dimensional refers to explicit courses and hidden courses. Growth and innovation mean that it must integrate "real, fresh and novel" so that students can learn to grow and create [12].

This paper studies the optimization of the undergraduate elementary education major curriculum system and the design of the information system. Firstly, the literature research method is used to explain the existing problems of the undergraduate elementary education major curriculum system and the optimization measures of the undergraduate elementary education major curriculum system. , According to the existing problems, carry out the design of the information system, and the detection experiment after the system is realized.

## **2. Research on the Curriculum System of Undergraduate Primary Education Major in Universities**

### **2.1. Problems in the Curriculum System of Undergraduate Primary Education Majors in Colleges and Universities**

#### **(1) The goal setting is vague and lacks specific guidance;**

Some colleges and universities require students to be trained to have strong growth ability and professional ability, have strong competitiveness in employment, and become applied talents with one profession and multiple skills. How to achieve these goals? How to observe? It can be seen that the training goals are very macroscopic and vague, lacking specific functions and practical guidance, which leads to differences between the status of the goals in the minds of students and the ideal goals in the curriculum, and it is difficult to apply them in actual teaching. . Can the four-year undergraduate teacher training achieve these training goals? The goal of training is vague and general. Different people may have different opinions. In this kind of teaching, the goal is invalid and will cause various problems in the learning system, which is not conducive to the cultivation of talents.

#### **(2) Too much emphasis on knowledge goals and not comprehensive enough**

According to relevant data, most students hold a one-way attitude towards the training objectives of primary education undergraduate studies in formal universities. One is that the main goal is to educate primary school teachers and the outline of the training plan has a specific difference, that is, to train high-quality elementary education teachers, education directors and researchers with multi-disciplinary teaching capabilities. The second is that the objectives of the course are set by course experts, and teachers and students do not have a sufficient and proper understanding of the course. What kind of people are trained for elementary education? The teachers and students are not accurate enough. Therefore, in actual teaching, teachers and students need to fully understand and clearly understand the training objectives to determine the learning direction and improve the quality of talent training.

#### **(3) The breadth of content is low, lacking integration and cutting-edge**

The new curriculum reform stipulates that the primary school stage will be based on a comprehensive curriculum. This puts forward stricter requirements on the overall quality of basic education and teaching staff. As the trend of knowledge integration becomes more and more obvious, the integration of branches becomes more and more common. Primary school principals need to concentrate on cultivating students' comprehensive knowledge and skills. However, through related research, it is found that the content of this course is relatively small and needs to be further strengthened.

#### **(4) There are many compulsory courses and relatively few elective courses**

Relevant data shows that ordinary universities have too many required undergraduate courses and fewer elective courses. The ratio of compulsory courses and elective courses is very different, which cannot meet the needs of students. Students rarely choose elective courses by themselves. Therefore, it can be seen that primary school graduates of ordinary universities tend to focus on compulsory courses, while the proportion of elective courses is relatively small. There are many compulsory courses, which not only increase the workload of students, but also ignore students' hobbies to a certain extent, so that students' right to choose independently limits their personality characteristics to a certain extent. Therefore, it is necessary to adjust the ratio of compulsory courses and elective courses, and increase the time of elective courses accordingly.

(5) The proportion of practical courses in the total class hours is too small

Under the pressure of efficiency and various examinations, our teaching is still stubborn in pursuing knowledge learning. In the university's four-year undergraduate primary school education, most of the time is to learn a variety of educational and teaching theoretical knowledge in the classroom. Therefore, undergraduates in regular university basic education emphasize the theoretical knowledge of learning education and teaching, while practical activity courses account for a small proportion of the total class hours. Theory lessons are more important than practical lessons. This is a relative feature of undergraduate basic education in formal universities.

## 2.2. Optimization Measures for Undergraduate Primary Education Major Curriculum System

(1) Establish a scientific curriculum concept

Curriculum view is the viewpoint, concept and understanding of the curriculum, which has a profound impact on the curriculum. To optimize the curriculum, we must first establish a scientific curriculum concept. With the development of the social era and the development of education reform, school curriculum construction is facing more problems. In this case, there is an increasing need for the guidance of advanced theoretical and scientific courses. Teachers, researchers and course managers need to keep pace with the times, establish correct courses and teaching concepts, and take into account the needs of students, the needs of society and the development of knowledge.

(2) Establish a diversified organizational guarantee

University subject courses are basically formulated by course experts and university department heads, and the understanding of the course of study by teachers and students is not accurate. The learning system they developed is more biased towards the ideal learning system. Without the participation of primary school teachers and students, the beautiful education plan can only be maintained. At the real level of implementation, there are often many problems and even failures. Therefore, in order to change this unique course staffing system, we need to pay attention to the different needs of course experts, front-line teachers and students.

(3) Clarify the training objectives of this major

To clarify the training objectives of basic education is to further optimize the conditions and foundation of the learning system. Only according to the needs of society, clarify the educational goals of this great man, strengthen publicity, so that students have a complete understanding of this great man, can we provide guidance for future teaching activities.

## 2.3. Big Data Algorithm

(1) Min count algorithm

The probability density function sets  $x$  as a random variable. If there is a non-negative real number  $f(x)$ , so that for any real number  $a < b$ ,  $P\{a \leq x < b\} = \int_a^b f(x)dx$ , then  $X$  is called continuous Type random variable,  $f(x)$  is the probability density function of  $x$ . The Min Count algorithm is proposed in the literature. The algorithm performs cardinality estimation based on the statistical information of the hash result. As the name implies, it is based on the minimum value of the sequence to estimate the cardinality. Assuming that the minimum value of the hash result of all elements in the multiset is  $X$ , the algorithm approximately considers the estimate of the set cardinality  $n$  to be one. The mathematical theory of the algorithm is:  $[0, 1]$  The minimum probability density  $f(x)$  of  $n$  random  $X$ -machine uniform variables in the interval is  $n(1-x)^{n-1}$ , so the mathematical expectation of the minimum value satisfies the following equation:

$$E(M) = \int_0^1 x \cdot n(n-1)^{n-1} dx = \frac{1}{n+1}. \quad (1)$$

According to the calculation result of the minimum mathematical expectation of the interval  $[0,1]$ , it is easy to think: when the expectation of one is obtained, its value is approximately equal to  $M$ . When the mathematical statistical analysis of the min count algorithm is carried out, it is found that  $x=0$  is one. Mathematical expectation integral equation-a divergence point, the following formula:

$$E\left(\frac{1}{M}\right) = \int_0^1 \frac{1}{x} \cdot n(1-x)^{n-1} dx = +\infty \quad (2)$$

### 3. Design of the Information System and Testing Experiment for the Undergraduate Primary Education Major Courses

#### 3.1. Optimize the Course Structure

For technical and technical subjects, project teaching is currently recognized as a teaching method. Practice shows that this is also a teaching method that is more suitable for professional practice. The courses of undergraduate colleges and universities have gradually transitioned from the isolated, closed, and overlapping teaching environment of various disciplines to the interdisciplinary, interoperable comprehensive teaching, which greatly promotes the integration of learning and knowledge, and straightens the correspondence between various disciplines. In view of this, according to actual operation and theory, each discipline is summarized and divided into two categories: project courses and subject courses. Project courses tend to focus on practice, and theoretical courses tend to focus on theoretical knowledge. However, there are some dual functions. This article summarizes them as a complete project training course. The purpose is to simplify the classification of courses and create conditions to facilitate the design of teaching information systems.

#### 3.2. Teaching System Design

##### (1) Syllabus

According to the requirements of national and local vocational education, combined with the actual requirements of schools and localities, scientifically and rationally formulate curriculum schedules for primary school undergraduates, and conduct teaching according to curriculum arrangements.

##### (2) Teaching arrangements

Including school day courses, timetables and related arrangements to adapt the timetable to special circumstances.

##### (3) Teacher platform

With the help of modern information technology, and based on the network platform, carry out teaching activities, such as lesson preparation, course selection, course development and online communication. Teachers rely on the platform to use more teaching methods, provide richer teaching materials for teaching services, and promote the improvement of teaching standards. Aiming at this goal, the platform is divided into four subsystems: course preparation system, teaching system, job posting and retrieval, teaching evaluation and reflection.

##### (4) Student platform

In order to facilitate students' learning, the platform is divided into four parts: online classroom,

teaching courseware, homework and examination system.

(5) Professional resource library

1) Learning resources are mainly used to meet the learning needs of students, such as professional practice question bank, standard case analysis, learning materials download and other educational materials.

2) Shared resources include outstanding student works, work and employment, original data related to the subject, well-known experts, well-known teachers' speeches (including teacher awards, outstanding books, etc.), links to network resources, etc.

(6) Platform for listening and evaluating lessons

The traditional listening and evaluation activities are mainly that the teacher first attends the lecture and records it, and then evaluates and discusses after the class. This method can only be completed in the classroom within the specified time, and time and space are limited, and it is impossible to conduct lectures and assessments at the same time. Create a platform for listening and controlling the course, not limited by time and space, you can play scenes and exchange views anytime and anywhere based on screen capture. This requires course records, and needs to configure collection, information reproduction and dynamic evaluation functions on the platform. Through real-time monitoring and storage of teaching records in the teacher's classroom, the integrity of the entire teaching process is ensured, which is helpful for the analysis of teaching results and learning results, so as to conduct an objective and fair evaluation of teaching results. The specific structure of teaching and listening is shown in Figure 1.

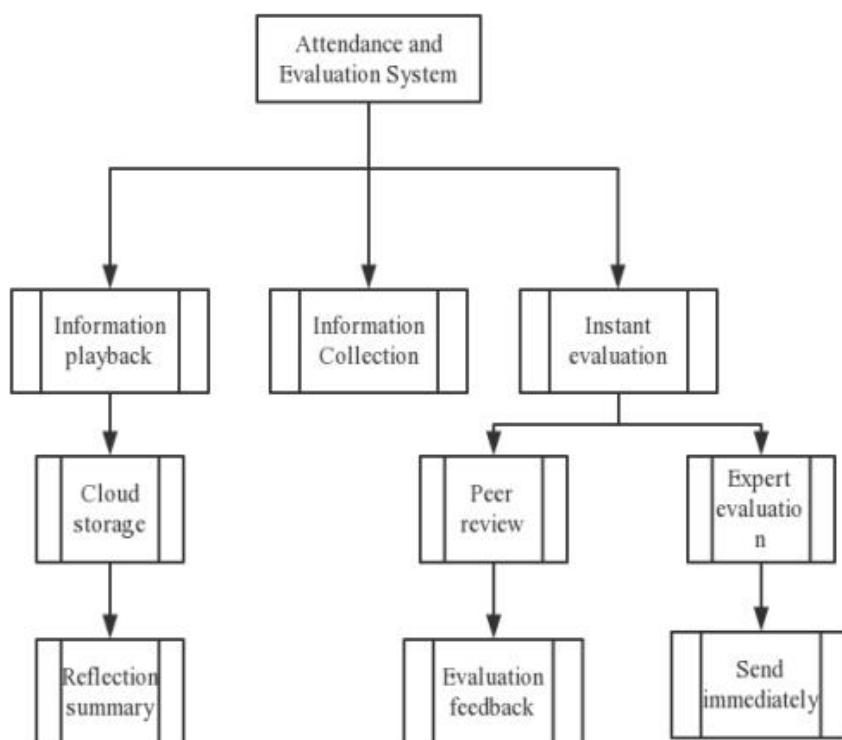


Figure 1. The specific structure of teaching and listening is shown in

(7) Cloud disk storage

The rapid development of cloud computing has transformed data storage from hard drives to cloud computing, which not only saves schools the expensive cost of purchasing or maintaining storage devices, but also makes storage safer and more convenient. First, the clothing information system stores data in the cloud, which simplifies the repeated storage of various platforms and focuses on the synchronization and sharing of resources, such as lesson preparation and teaching systems. Separate storage will not only lead to duplicate storage and redundant data, but also cannot be shared. Once the relevant content of the course preparation system is modified, the teaching system should also be modified. Cloud storage solves this problem well. Once saved, any platform can be notified. Eliminates the problem of data out of sync. Second, cloud storage enables the freedom to access data from different devices and cloud terminals (such as computers and mobile phones). Users can use different devices to access their data anytime and anywhere, which simplifies data transmission and repetition functions, and promotes more comprehensive and practical functions.

### 3.3. Detection Experiment

#### (1) Test principle

- 1) All tests should be based on user needs;
- 2) Software testing should be carried out as soon as possible, and the software needs to be tested continuously;
- 3) The Pareto principle (called the Pareto rule in Chinese, also known as the 80/20 rule) should be fully applied to the soft  
Piece testing;
- 4) Exhaustive testing is impossible;
- 5) The test scale should start small, and then gradually increase in scale;
- 6) In order to achieve the best test results, an independent third party is required to conduct structural tests on the system.

#### (2) Test tool

This article uses Rational Robot as a system testing tool. Rational Robot is a part of Rational Test Manager, which is an automated operation test software developed by IBM. It is an effective and convenient testing software. Test managers can easily plan, execute and manage all test activities. It supports two modes of manual testing and automatic testing, and can generate test reports according to the rules set by the tester.

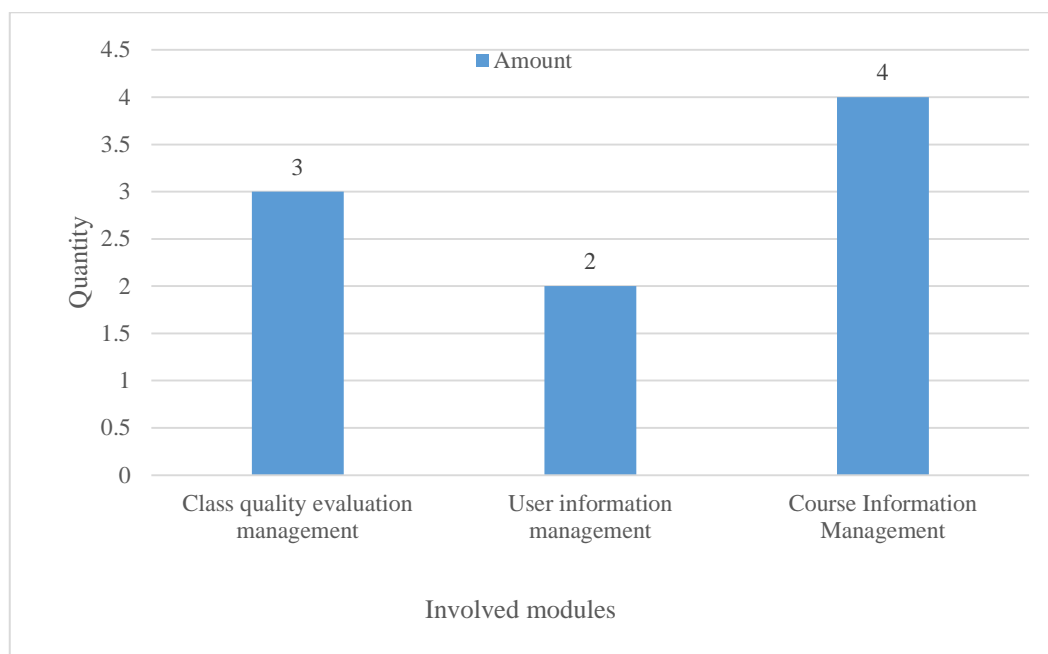
### 4. Experimental Results

During the testing process of the system, a total of 9 problems were found, including 1 serious functional defect, 2 minor defects but did not affect the normal operation of the system, 2 browser compatibility issues, and issues related to the ease of use of the system. Suggest. There were 2 personality problems in the system, and 3 problems did not meet the user's expectations. After subsequent revisions, all problems have been effectively resolved and the standards recognized by users have been met. The distribution of defects found in the process of system testing among the various functional modules of the platform is shown in Table 1.



*Table 1. The distribution of defects in the various functional modules of the platform*

	Amount	Severity
Class quality evaluation management	3	Minor, recommended
User information management	2	Slight
Course Information Management	4	Recommended

*Figure 2. The distribution of defects in the various functional modules of the platform*

It can be seen from Figure 2 that system problems mainly appear in the course design module, and four of them appear in the course design module.

## 5. Conclusion

With the changes in demand for talents in the society and the deepening of basic education curriculum reform, it is very important and indispensable to study the undergraduate learning system of basic education in ordinary colleges and universities. The optimization of the undergraduate basic education system in ordinary universities is systematic and complicated. In the context of the new social era, the development needs of students should be fully considered in accordance with the training requirements of teachers in high schools and primary schools.

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## Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.



## Conflict of Interest

The author states that this article has no conflict of interest.

## References

- [1] Ri C N, Kim S G, Ju K S, et al. *The Influences of Faculty on Undergraduate Student Participation in Research and Creative Activities. Innovative Higher Education*, 2018, 8(3): 173-183.
- [2] Maryam, Foroozesh, Navneet, et al. *Optimization of Scale-Up Synthesis of Anti-Cancer Ceramide Analog 315. Journal of undergraduate chemistry research*, 2018, 16(3):89-90.
- [3] Firdaus F , Dewi F . *Application of Contextual Teaching and Learning (CTL) Components In Telecommunication Network Design and Optimization Course. International Journal of Chemistry Education Research*, 2018, 2(1):24-33. <https://doi.org/10.20885/ijcer.vol2.iss1.art5>
- [4] Boon V , Ridd M , Blythe A . *Medical Undergraduate Primary Care Teaching Across the UK: what is being taught?. Education for Primary Care*, 2016, 28(1):23-28. <https://doi.org/10.1080/14739879.2016.1222887>
- [5] Dutta N , Maini A , Afolabi F , et al. *Promoting Cultural Diversity and Inclusion in Undergraduate Primary Care Education. Education for Primary Care*, 2021(3):1-6.
- [6] Rouse K A, Kuroski J A, Cook N , et al. *In Real Life: Evaluating Primary Care-Based Undergraduate Dental Education in Northwest England. British Dental Journal*, 2019, 226(8):605-610. <https://doi.org/10.1038/s41415-019-0204-z>
- [7] Serin M K . *Undergraduate Students' Perceptions of the Mathematics Courses Included in the Primary School Teacher Education Program. European Journal of Educational Research*, 2017, 6(4):541-552. <https://doi.org/10.12973/eu-jer.6.4.541>
- [8] Junji, Nishiyama, Mikihiko, et al. *Education and Enlightenment of Psychosomatic Medicine : Undergraduate/Postgraduate Medical Education and Promotion of Psychosomatic Medicine for Primary Care Physicians. Japanese Journal of Psychosomatic Medicine*, 2016, 56(11): 1098-1103.
- [9] Vera P G , Corisco A . *Audiovisual materials: a way to reinforce listening skills in primary school teacher education. Language Value*, 2016(8):1-25. <https://doi.org/10.6035/LanguageV.2016.8.2>
- [10] Yuan S, Carson S J, Rooksby M, et al. *Does Dental Undergraduate Education and Postgraduate Training Enable Intention To Provide Inhalation Sedation In Primary Dental Care? A Path Analytical Exploration. European Journal of Dental Education Official Journal of the Association for Dental Education in Europe*, 2017, 21(3):193-199 <https://doi.org/10.1111/eje.12200>
- [11] Fuchs C . *35.1 Teaching Model for Integration of Psychiatry and Primary Care at the Undergraduate Medical Education Level. Journal of the American Academy of Child & Adolescent Psychiatry*, 2018, 57(10):S50-S51. <https://doi.org/10.1016/j.jaac.2018.07.215>
- [12] Konstantina, Rentzou. *Mapping Gender Segregation in Pre-Primary and Primary Education in Cyprus. The Journal of Men's Studies*, 2017, 25(2):198-219. <https://doi.org/10.1177/1060826516658765>