

# Construction of Evaluation Index System of University Education Informatization from the Perspective of Big Data

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**Abstract:** The informatization of higher education is an important part of the informatization of the society, and it is also the only way for the modernization of colleges and universities. For the evaluation of teaching quality in Colleges and universities, relying on big data, more data can be collected as the basis of evaluation, but at the same time, it also increases the difficulty to find accurate and effective information from the huge amount of data materials. In this paper, through careful analysis of the composition scheme of the national informatization index system, the relevant principles for formulating the evaluation index system of university informatization level are determined. Based on the indexes established by other scholars, the index system is greatly adjusted according to the characteristics of university informatization, and the basic elements and specific composition of the evaluation index system of university informatization are determined.

## 1. Introduction

University informatization is an important part of national informatization. Colleges and universities are important places for students to grow up. In the information age, the management of college students and education and teaching work in colleges and universities should also fit the background of the times <sup>[1]</sup>. Compared with developed countries, there is still a big gap in the informatization construction of colleges and universities in China. With the deepening of China's informatization construction and the continuous improvement of informatization level, it has become very urgent and of great strategic and practical significance to establish an evaluation index system of informatization level of colleges and universities which is not only suitable for China's national conditions, but also in line with international standards.

With the rise of new technologies such as cloud computing and big data, information data is also growing rapidly, and mankind has entered a new information age <sup>[2]</sup>. Big data focuses on deep mining and scientific analysis of multidimensional and massive data, in order to seek the hidden relationship and value behind the data, which is helpful to change the educational evaluation from speculation based on small sample data or fragmented information to evidential decision based on all-round and whole-process evidence. To promote construction by evaluation, to promote reform by evaluation, to combine evaluation with construction, to focus on construction, to find and improve problems in informatization construction in time, to optimize informatization construction, and to improve the level of informatization development of higher education.

## 2. Present Situation of Evaluation System of Educational Informationization Level in Colleges and Universities

Jiang Dongxing et al. <sup>[3]</sup> established a fuzzy matrix including 8 first-level indicators and 32 second-level indicators on the application of qualitative and quantitative indicators to measure the informatization level. Yuan Yongkang <sup>[4]</sup> directly put forward the concept of “informatization of colleges and universities”. He believes that the so-called “informatization of colleges and universities”, that is, taking information and communication technology as tools and means, taking digital campus as the technical foundation, fully applies information technology to the management, teaching, scientific research and book resources of colleges and universities, so as to promote the level and efficiency of management, teaching and scientific research of colleges and universities. Xiao Shen <sup>[5]</sup> constructs the evaluation index system of educational websites from the aspects of

website content, technology, utility and development according to the principles of overall completeness, scientific rationality and simple feasibility of websites.

Lin li et al. <sup>[6]</sup> constructed the index system of balanced development of education from four dimensions: balanced educational opportunities, balanced allocation of educational resources, balanced educational quality and balanced educational achievements. With the allocation of educational resources as the core element, the balanced development index system of education is constructed from four aspects: regional education balance, urban and rural education balance, school education balance and group education balance. Liu Zhihui et al. <sup>[7]</sup> applied comprehensive analysis to carry out statistical analysis to measure the level of informatization of higher education in China. Xiao Lin <sup>[8]</sup>, referring to the current situation and trend of foreign universities' informatization construction, established a basic framework of university informatization index system for the first time, and designed six indexes including strategic position, infrastructure, application, information resources, human resources, organization and management.

### **3. Basic Principles of Constructing Evaluation Index System of Higher Education Informatization**

#### **3.1 Guiding Principle**

The design of informatization index of higher education should have a certain purpose and realize its guidance. It is necessary to comprehensively reflect the current situation of higher education informatization construction and development, so as to facilitate the formulation and promulgation of necessary policies and systems, and promote the education informatization construction and development of colleges and universities as a whole; In addition to mastering the operation and application of basic information sources such as computers and networks, college education administrators should also be able to effectively use modern information technology to use and retrieve the required information in education management, improve management efficiency and promote teaching quality.

#### **3.2 Scientific Principle**

The scientific principle means that the evaluation system of university education informatization should be comprehensive and reliable, and the related indicators should have relevant scientific basis. According to the evaluation results of the index system, we can objectively understand the level and existing problems of higher education informatization construction. It can provide reference for formulating relevant policies and plans, and effectively improve the level and quality of education informatization construction in colleges and universities. It is necessary to carry out the necessary correlation analysis on each specific index, which should be comprehensive and systematic, and avoid duplication, so that each index has an irreplaceable role.

#### **3.3 Operable Principle**

Operability principle means that the design of the index system should take into account the operability and ease of use when the system is applied, and should select as few indicators as possible to reflect a more comprehensive situation. Evaluation indicators must be defined accurately, and there should be no duplication between indicators. Evaluators can facilitate data collection and analysis according to the description of indicators.

#### **3.4 Dynamic Principle**

The improvement of index system is a dynamic process. On the one hand, with the deepening of the research, the index system needs to be constantly adjusted and revised, which is a behavior that runs through the whole research process. On the other hand, because China's education

informatization is still in the early stage of construction, it is constantly developing and changing both in theory and in practice. Therefore, the design of higher education informatization index system should not only be extended in time, but also be updated in time to meet the needs of the development and change of the situation and ensure its scientificity.

#### 4. Construction of Evaluation Index System of Higher Education Informatization

##### 4.1 Framework of Evaluation Index System of Higher Education Informatization

There are many factors that affect the development of schools. As far as evaluating school effectiveness is concerned, there are background factors, input factors, process factors and result factors. Although the specific representations of the indicators are different, the indicators system has a comprehensive coverage of the research objects, which ensures the scientific nature of the indicators. In the era of big data, the realization of university teaching informationization will inevitably require the reform of university education management, and university management informationization is an important component of education informationization. So as to push more effective resources for college students and social organizations, and promote the effective use of information resources in colleges and universities. However, it should be noted that the use of big data technology in universities is not optimistic.

According to the reality of informatization in colleges and universities in China, combined with the existing research results of social informatization, and based on the principle of establishing indicators and the characteristics and policies of educational informatization, a three-dimensional comprehensive evaluation system of informatization in colleges and universities is constructed. The evaluation index system is divided into three levels, namely, 6 first-level indicators, 19 second-level indicators and several third-level indicators. The evaluation index system is shown in Table 1.

Table 1 Composition Scheme Of Evaluation Index System of Informationization Level in Colleges and Universities

Primary index	Secondary index	Three-level index
Infrastructure	Network facilities	Network equipment; Network structure; Network security equipment
	Service facility	Uplink rate; Number of Internet information points per capita; Multimedia production system
	Basic facilities	Number of computers per teacher and student; Number of multimedia classrooms
Application system	Office automation system	Administrative affairs system; General management system; Personnel management system; Equipment management system
	Campus card system	Campus card management system, student registration management system and data settlement system
	Digital campus system	Digital library; Educational administration management system; Teaching management system; Student information management system
Information resources	Basic information resources	Basic information database
	Electronic information resources	E-book ownership
	Network information resources	Number of websites; Number of website links; Page update cycle; Number of online databases
	Multimedia software and courseware	Multimedia software; Ownership rate of teaching courseware
Information technology education	Information technology training plan and measures	Regular training plan; Training effect assessment system
	Qualified rate of information technology compliance	Number of people who have obtained training certificates in computer, multimedia and network technology
	Information technology course	The proportion of relevant information technology courses in the teaching plan
Distance education	Teaching system	Teaching plan; Curriculum syllabus; Student status

Information services		management; Achievement assessment
	Educational scale	The ratio of distance education to the total number of students
	Educational website	Web page settings; Website service
	Network service	Email; File transfer; Information release; Domain name service
	Search engine	Basic search; Advanced retrieval; Directory browsing and retrieval; Other function retrieval

The main purpose of informatization construction of higher education is to make use of modern information technology, vigorously develop information resources, and serve school management, teaching, scientific research and many other aspects. On the one hand, the establishment of index system should be comprehensive, which can not only complete the comprehensive evaluation task with as few indicators as possible, but also make statistics according to individual indicators, universities, provinces and cities, which is convenient for data collection and processing; On the other hand, it should be operable. Using big data technology, learning content, learning time and learning methods can be optimized by methods and technical means such as probability prediction.

## 4.2 Description of Evaluation Index

### (1) Infrastructure

This is the main index to measure the development level of school education informatization, because the amount of investment in informatization construction represents the development level of education informatization in a university to some extent. Infrastructure construction mainly assesses the construction level of hardware facilities. Its development degree is directly related to whether informationization has the corresponding material conditions. The data design stage usually starts from the teaching research center or the teacher development center, and designs the evaluation data content and method according to the theoretical basis of psychology, pedagogy and sociology; The data collection stage depends on the school information technology department, library services and other student testing and investigation management centers. Multimedia classroom is convenient for teachers to use courseware for teaching, can stimulate teachers' enthusiasm for developing teaching information resources, is convenient for large class teaching, and meets the needs of modern teaching.

### (2) Application system

The evaluation index system of higher education informatization is the realistic requirement of promoting the development of education informatization. Education informationization is the foundation and propeller, and the only way to realize education modernization. The educational administration management system should also pass the certification of the competent education department and be redeveloped according to the actual situation of the school. Only the system that meets the actual situation of the school can serve the school better. Through the campus information network of the school, computers everywhere are gradually connected into a relatively large data network, so as to realize the unity and standardization of all kinds of data in the whole school, and improve the modern management level of the school and the enthusiasm and initiative of students in learning.

### (3) Information resources

The development and application of educational information resources is one of the core contents of informationization in colleges and universities. Therefore, the development and utilization of information resources is the core index to measure the achievements of educational informationization in colleges and universities. This index can be reflected by eight secondary indexes, such as teaching courseware ownership rate, teaching software ownership rate, independent development rate of teaching management software, e-book ownership, CD-ROM database ownership, online database ownership, http and ftp resources ownership and resource retrieval level.

### (4) Information technology education

Compared with traditional education, emerging media is more direct, fast and convenient, and is

also in line with the current study and living habits of college students. The development of emerging media is also a remarkable feature in the context of big data era. Because information technology is the core technology of information construction, the application status of information technology reflects the ability of schools to develop and manage information to a certain extent. We should pay attention to the balanced allocation of potential educational resources-the application level of educational informatization. Only in this way can we pay attention to the balance of educational informatization construction conditions as well as the balance of its process and results.

#### (5) Distance education

In the information age, we should actively carry out curriculum system reform and expand teaching content. At present, one of the most obvious characteristics of emerging media is timeliness and rapidity, and the message transmission rate is very fast. Therefore, we should strengthen the use of the communication advantages of emerging media in the education process. The teaching system of distance education refers to the management system of implementing the teaching plan, curriculum syllabus, student status, performance assessment, rewards and punishments and graduation certificates of distance education majors; Students can also supervise and manage their learning progress through software, and communicate with instructors in time. For another example, data can be used to predict the retention rate and graduation rate of students.

#### (6) Information services

With the continuous application of big data, it is frequently used in various fields at present. Universities are important places for students to study, and also places where scientific research gathers. The information service index system includes: network service and search engine. The basic services that the campus network can provide include: E-mail, file transmission, information release, domain name service, identity authentication and directory service, etc. The diversified application of data also improves the consciousness and initiative of teachers and teaching administrators to participate in the evaluation of teaching quality. Data is not only used as evaluation materials, but also as evaluation results, which are constantly applied to the evaluation.

## 5. Conclusions

College education informatization is an important direction and measure to comprehensively and deeply apply modern information and technology in the field of college education, promote the development, integration and utilization of educational information resources, and comprehensively promote educational reform and development and educational modernization. This process involves all aspects, links and levels of education, teaching and management. With the help of big data technology, the management of colleges and universities can become more precise, and the management work of colleges and universities can be carried out better, and the development strategy can be adjusted constantly. By establishing a set of systematic, complete and scientific evaluation index system of university informatization and matching measurement and evaluation methods, the effect of university informatization can be evaluated by adopting appropriate evaluation algorithms, which provides decision-making basis for formulating university development strategies and policies.

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