



Study on Benchmarking System of Vocational Education Under Future Information Technology

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Abstract. Selecting benchmarking system for vocational education informatization, guiding vocational college informatization construction and responding to the demands of the era of “Internet+” are important issues for vocational education informatization construction and also important contents for vocational education development. To that end, the article is given priority to with benchmarking method To thought, to extract the benchmarking standards as the goal, the comprehensive many kinds of research methods, combined with the characteristics of vocational education informationization, established a set of informatization level of business support, information technology, information technology, information management and information technology application performance continuous development ability of five dimensions, depth of coverage, the information technology application of information technology and information technology intensive degree, information technology business synergy degree of 26 observation indexes such as benchmarking system vocational education informatization evaluation standard system, And how to set the observation content of 26 observation indexes is systematically expounded.

Keywords: Vocational education · Informatization · Benchmarking · Evaluation criteria · The content dimension

1 Introduction

1.1 Preface

Informatization is playing a constantly improving role in shaping a more open, more suitable, more people-oriented, more fair and more sustainable education ecology. It is an important content of education development in the new era to comprehensively enhance the level of educational informatization. In the field of vocational education, big data, cloud computing and artificial intelligence have gradually infiltrated into the overall

layout of vocational education informatization, and a large number of foundations have emerged.

In the application of new technology information, a new generation of information characteristics characterized by system, integrity and openness has been gradually formed. On the basis of summarizing the results of information construction, how to further promote information construction and better serve vocational education has been put on the agenda. Based on this, the Action Plan for Improving Quality and Cultivating Excellence in Vocational Education (2020–2023) points out that “guidance should be given to the vocational school system “. To design the overall solution of school informatization” “to select 300 left and right vocational education informatization benchmarking system”. However, what is the benchmark school of vocational education informatization, what are the characteristics of the standard school of vocational education informatization, what dimensions are included in the evaluation criteria, and what are the observation contents etc. need to be further studied.

2 The Connotation of Vocational Education Informatization Benchmarking System and Its Metaphor

2.1 The Connotation of Vocational Education Informatization Benchmarking

With the gradual deepening of information technology [1], the construction of networked, digital, intelligent, personalized and life-long education system has become the development direction of education form supported by information technology. Information technology has promoted the reform of educational concept, educational content, teaching and learning methods Type change, education evaluation reform, education management system, such as a full range of change, formed from concept to practice, from the tool to the elements, from the node to the structure, from the base to the application of comprehensive education form change, as the education main body activity promotion, efficiency improving, innovation improvement, coordination ability and competitiveness improvement, and the “differentiation, personalized learning, fine management, teaching wisdom can service”: First, to form some aspects such as research and practice into a fruit [2]. It is necessary to find out the supporting relationship between the performance of vocational education informationization and the development of system and establish an appropriate evaluation index system to ensure the direction of vocational education informationization development, so as to guide vocational colleges to correctly formulate informationization strategies in line with the internal needs of vocational education. Benchmarking system vocational education informatization is in accordance with the specific evaluation standard, will obtain good information in the field of vocational education of colleges and universities, the elements of a full autopsy, forming a series of standards, making it the other vocational school informatization construction reference, to information technology on professional education of the whole party, realize information the overall benefit of vocational education.

2.2 The Metaphor of Vocational Education Informatization Benchmarking System

In fact, the selection of benchmarking system for vocational education informatization is to establish a set of evaluation standards for the development of vocational education informatization, which can be used to guide the corresponding construction of vocational education informatization [3]. According to Braudel's view of time period, a short period refers to an event occurring in a specific time; Intermediate period refers to a structure that is stable in relation to each other over time; Long time is a measure of centuries, a structure that evolves slowly over long periods of time. Obviously, the influence of informationization is applicable to the analysis of thinking in the middle period of time, the construction of thinking in the long period of time and the explanation of phenomena in the short period of time. According to the logic of historical evolution, the metaphor of the characteristics of vocational education informatization benchmarking system is embodied in the following three aspects:

First, the benchmarking system of vocational education informatization refers to the excellent level of informatization effect. "Benchmarking" clearly implies an evaluation of past experience, referring to the ability and effectiveness of the previous application of information technology to achieve a pre-eminent position. It is reflected in the degree of perfection and governance effectiveness of the school's governance system through informationization, whether it has promoted the optimization of the operation mechanism of vocational education and established a curriculum system that meets the needs of informationization, and whether it has been implemented through information technology.

Now teaching and learning mode innovation and effectively solve the important problems in vocational education. Most importantly, the school information to realize the change of the concept of school development and value orientation, especially associated with modern vocational education concept of vocational education knowledge, career skill education and vocational education and cultural value, and realized based on the information technology education and the education information of the whole, in the school of the achievements have been made in the all-round improvement of comprehensive strength.

Secondly, the benchmarking system of vocational education informatization refers to the promotion level of informatization ability. The most intuitive manifestation of the development level of vocational college informatization is the degree to which the existing informatization status can promote the rapid development of business. It can be embodied as follows: First, informatization has the advantages of wide field scope, deep level and far influence. Applying informatization to all aspects of education and teaching can produce stable performance, improve the operating efficiency and quality of teaching business related to the school system, and export information technology-related products to the outside. Secondly, the application of informatization innovates the teaching format and management process, improves the teaching process and the supporting situation for teaching, produces different teaching products and service products from ordinary colleges and universities, and affects the innovation of vocational colleges and universities' informatization. Third, the research and management related to

the application of information technology can provide continuous support for the development of informatization. Informatization is a complex system project, and the most important factor that determines the effectiveness of informatization is management. The research and management of informatization in the “middle period” of school can promote the development of informatization through management.

The third, the benchmarking system of vocational education informatization refers to the guarantee force facing information informatization in the future. Since information technology is a process of continuous development, past performance and current capability are not indicative of future capability of sustainable development. Vocational education informatization standard system need to support the continuous development of system with the help of “education technology ability training system, research support system and talent training system”. That is to say, vocational education informatization benchmarking system contain the guarantee power of “winning both now and in the future”. First, the establishment of information sustainable development mechanism, can ensure the personnel, assets and other related resources of the sustained investment and scientific operation; Secondly, through the construction of information management mechanism, the space for the application of information has been expanded to support scientific research personnel and technology Maintain good working condition of personnel and management; Third, it has become a long-term information talent selection and cultivation mechanism, which can carry out research work around the corresponding topics.

3 The Selection Concept and Principle of Vocational School Informatization Benchmarking System

3.1 Selection Concept of Vocational Education Informatization Benchmarking System

On the one hand, vocational college information construction is a school development project under the dual logic of “problem-driven” and “benefit-driven”. “Problem-driven” refers to the application of information technology to solve problems faced by vocational education, such as teaching model, teaching content, evaluation model, governance system, etc. The “benefit drive” is reflected in the continuous expansion of learning content of vocational education, especially the new development opportunities brought about by the integration of different fields, which requires learners to acquire more knowledge, and also puts forward the corresponding managers’ updating demands from governance concepts to actions. On the other hand, the characteristics of vocational education informatization benchmarking system are also influenced by the dual logic of “problem driven” and “benefit driven”. On the problem of vocational education informatization, the orientation of informatization input is not clear, and the phenomenon of attaching importance to “hard” rather than “soft” always exists, which perplexes the education decision-makers’ faith in vocational education informatization and causes the imbalance of input in fact. In the benefit, the huge amount of information resources investment did not bring the corresponding significant results. Therefore, in setting up vocational college informatization appraisal standards in the process of benchmarking, the information

construction should be fully considered in solving the problem of the education teaching, teaching management, second, we must scientifically evaluate efficiency problem in the process of informatization construction, prison hold good problem solving and continuous influence orientation, overall architecture and use efficiency evaluation.

3.2 Use Problem Solving to Shape the “Good Value” of Technology

Problem solving is the first driving force of vocational college information construction. In the early stage of the development of information technology, it is usually through the introduction of information technology to solve the problems of personalized learning, learning space shaping, teacher learning analysis, teaching process management, school governance system. Only on the basis of solving the problem can we gradually realize the value of information technology in education quality, education equity, education reform and education innovation, and in the view and value of information technology method which takes global benefit and common commitment as the common value goal to achieve a consensus on the value orientation, to support the high-quality development of vocational education, and to create a good environment for its development.

3.3 Expand the Application Space of Information Technology with Continuous Influence

In reality, the contradiction between the rapid expansion of vocational education and the lack of supporting resources, the contradiction between the extensive development of vocational education and the demand for high quality, and the contradiction between the superficial teaching research of vocational education and the demand for large-scale personalized teaching gradually emerged. The existence of these contradictions requires virtual reality technology to expand learning space through the creation of virtual space, big data to form personalized learning content, artificial intelligence to support learners' adaptive learning, and internetworking technology to form “connected learning” (a form of learning that supports learners to teach and educate learners). The final result of informationization is to form an intelligent learning ecology that is “intelligent, integrated, creative, situational and open”, realize the integration of information technology with education and teaching, and promote the expansion of information technology application space in the continuous integration with education and teaching.

3.4 Promote a Holistic Approach to the Application of IT

Only by focusing on specific aspects can there be a quick solution to a problem. Due to the diversity of information elements, the in-depth application of information technology cannot be fully explained by relying on technology, nor can it be separated from the discussion of technology between people and business. Instead, the effectiveness of information construction in vocational colleges should be evaluated from the point of view of system integration. Therefore, vocational education informatization benchmarking system selection work need to use the concept of overall architecture, deep understanding of education informatization of education concept, education content,

education evaluation and its governance mode change, the informatization infrastructure resources, simulation training space and the influence of the digitalization construction of venues and so on, based on the information of teaching and learning, evaluation and management of the overall effect, promote the information technology application in the field of vocational education the all parties.

3.5 Regulating the Health Application of Information Technology with Benefit Evaluation

The ability of information technology, especially the ability of sustainable development of information technology, determines the benefit of information technology application. At present, the investment benefit of information technology in certain fields and some system is not high, especially under the premise that the resources occupied by vocational education is not enough, it needs to be regulated by benefit evaluation.

Health applications of information technology. The selection of benchmarking system for vocational education informatization needs to introduce the concept of benefit evaluation into vocational education informatization, and explore and form a shared, iterative and modular problem-solving concept in the process of informatization construction, so as to efficiently solve complex and diversified problems by using information technology.

4 Principles for the Selection of Benchmarking System for Vocational Education Informatization

The selection of benchmarking system for vocational education informatization is mainly to establish guiding standards for the construction of vocational education informatization under the support of specific concepts. From the perspective of selection, one needs to consider the measurement capability of the standard, and the other needs to consider the realistic environment of evaluation. Specifically, the selection principles of the following three aspects should be included.

4.1 Combine Science and Comparability

From the selection mechanism for benchmarking system selection is a kind of based on the benchmarking management, is a kind of practical reason, its value is “to change or achievements To point to in the world, and for the related appraisal activities more, make the evaluation objects presents the characteristics of the normative “(3), reflects the transformation of” how to “rational. The value of selection lies in providing reference for the informationization construction of vocational colleges and universities. The criteria of selection are based on the theoretical basis with practical reference, and finally become the “cognitive externalization” of practical rationality. However, not all behaviors can be accurately valued on a comparable scale. If the existing data acquisition environment can't be condensed corresponding standards as a reference for other system, it will lose the value of benchmarking.

4.2 Integrity and Dispersion

Professional education from the perspective of the demand of information technology, information technology by blended learning space make learners with the school teaching and cultural Angle, multi-level, need through the teaching and learning, individualized learning, fine management, and service to solve the deep-seated problems facing the vocational education, to build a new platform and enterprise cooperation, realize social service extension of the scope and level up, these are embodied in the overall architecture of vocational education informatization. However, it is difficult for the overall evaluation to have clear directivity and play the role of benchmarking. It is necessary to put specific contents into the standard system for evaluation, form the interaction between the whole and the parts, and give the whole a specific meaning.

4.3 The Combination of Representativeness and Orientation

Representativeness is usually related to the special color, which refers to the formation of certain characteristics in the whole or a certain aspect of university informatization. In reality, some system have transformed the classroom through the deep integration of information technology and education teaching. Some system have promoted the reform of teaching process based on information environment by enhancing teachers' information-based teaching ability. With the help of data acquisition system, some system have constructed a learner evaluation system involving multiple stakeholders. Some system, with the help of information resource integration technology, have completed the communication and connection of multiple types of data, forming a small "big data" ecology. Representation performance accurately describes the achievements of specific system in the field of informatization, which is an important criterion for selecting the benchmarking system of informatization. However, while considering the representativeness of selection and selection standards, we should also consider the guiding function of standards to accurately grasp the development level of information technology at the present stage.

4.4 The Evaluation Criteria and Content of Vocational Education Informatization Benchmarking System

A number of researches have been carried out on the evaluation of enterprise informatization at home and abroad, among which the most influential ones are Nolan model, SW-CMM model, and technology-information excellence model. At the same time, a lot of informationization technical standards have been introduced at home and abroad, which contains certain implication of price evaluation. In 1996, the United States issued the first National Educational Technology Plan, which required every teacher to have an Internet-connected computer, high-quality learning software and good training. In 2002, Singapore comprehensively reviewed the dynamic ratio, teacher/machine ratio, network transmission technology speed and teachers' requirements for curriculum integration ability. In 2001, China began to release the National Informatization Indicator, taking the lead in putting forward the "National Information Index", which realizes the evaluation of the national informatization degree and covers 20 quantitative indicators. However,

in the field of vocational education, there are few diagnostic evaluations on the degree of informationization of specific colleges and universities. According to the existing research, the evaluation demand and application of vocational education informationization have the problem of supply and demand decouple. On the one hand, the rapid development of information technology has led to the systematic reform of vocational education. On the other hand, when the government organizes information construction, it cannot find a reasonable evaluation standard to guide the systematic advancement of information construction. Therefore, it is necessary to design vocational education scientifically according to the goal and stage characteristics of Informationization.

4.5 Evaluation Criteria of Informationization Benchmarking System and the Formation Process of Evaluation Criteria

Open coding based on expert interviews. This study adopts the Delphi method to issue an open questionnaire to 34 experts in the field (including 11 vocational education informatization research experts, 12 university informatization directors, 6 government administrators in charge of information technology, and 5 school leaders in charge of information technology). The first survey centered on the following questions: What do you think about the information system for vocational colleges? In your opinion, what factors can summarize the degree of informationization of a school? What do you think your accredited vocational system do well in informationization? In your opinion, what aspects should be paid attention to in the informationization of vocational education? Through the research, the text material of 230,000 words (recording conversion) was formed. The investigation materials were coded in an open manner, and specific expressions of the application of informatization were extracted, as shown in Table 2 below.

4.6 Information Research Content Analysis Based on Nvivo

CSSCI was obtained by obtaining research data related to informationization from 2015 to 2020, 1390 journal papers were imported by Nvivo to carry out content analysis, and 110 keywords were formed in 7 dimensions, as shown in Table 1.

Table 1. Text analysis results of informationization research based on Nvivo

The serial number	The dimension	Keywords
01	Content	Rural education informatization; National education informatization; Special education informatization; Educational technology; "InternetNet+"; Basic education; Regional planning; Regional education informatization;

(continued)

Table 1. (continued)

The serial number	The dimension	Keywords
02	Function	Information leadership; Intelligent education; Big data; Targeted poverty alleviation through education; Smart campus; The beauty of morality, intelligence and physique law; Rural education; Special education; Supply-side reform; Information literacy;
03	System	Evaluation index system; Educational governance; Intelligent education; Educational technology; Basic education; Information-based teaching; Education cloud; Learning society; Digital education resources;
04	Standard	Technical standards; Curriculum standards; Quality standard; Competency standards; Policy orientation; Application; International experience; information. The source construction; Quality management;
05	Value	Educational equity; Informationization of education management; Educational resources

Table 2. Information application and benefit description

The serial number	Keywords	The serial number	Keywords
01	The technical level	151	Information concept
02	Business covers	152	Standard interaction
03	Content to deepen	153	Talent cultivation
04	Strengthen cooperation	154	Policy
05	Students analysis	155	Social influence
...
50	Way to change	194	Information ethics

4.7 Spindle Coding Combining the Two Methods

The research team clustered the above keywords from the perspective of evaluation. Through the open coding structure and research data combing, the relationship among relevant concepts was formed and new concepts were given. On this basis, six core dimensions were preliminarily summarized and formed. There were 28 observation indexes. The dimension of information technology level includes six observation indicators: technical standard, system application technology, data resources, system platform, information network and information security design. The dimensions of information technology application performance include operation efficiency, satisfaction of talent cultivation, organizational growth ability, student service ability, teacher service ability and management. 6 observation indexes of management service ability; The dimension

of information management ability includes information management and information group. The four observation indexes are the ability of weaving, the process and system of information construction, and the development of information chemical tools [4]. The continuous development ability of informationization includes four observation indexes: educational technology training ability, reserve talent training ability, educational technology research ability and educational informationization standard construction ability. The dimension of informationization guarantee capability includes four observation indexes: capital input, system norm, technology basis and governance basis.

5 Evaluation Standard Optimization Based on Delphi Method

Summarizing the above research process, experts were consulted on 29 observation indicators in 4 core dimensions [5]. Figure 1 Evaluation dimensions and observation indexes of vocational education informatization benchmarking system.

$$K = (TA - \sum_{n=1}^{\infty} EF) + (TU - \sum_{n=1}^{\infty} EF) \tag{1}$$

The dimension indicators. Information business support Information technology coverage, information technology application depth, information technology application intensity, information technology business synergy degree. (The formula 1).

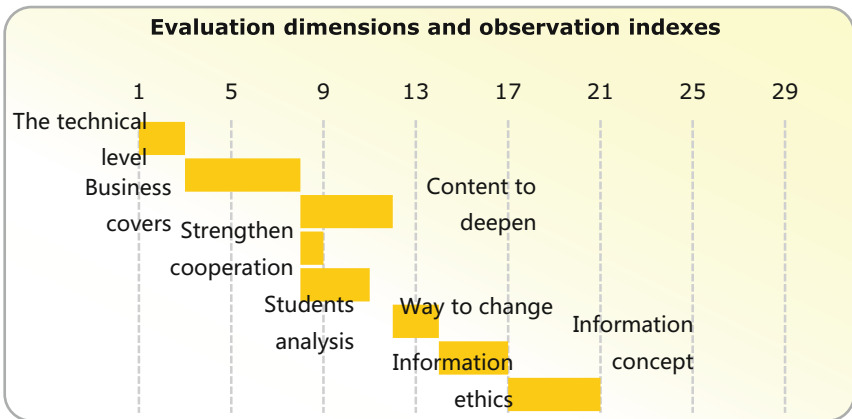


Fig. 1. Evaluation dimensions and observation indexes of vocational education informatization benchmarking system

Total units of protocol (TA) between two users minus the expected frequency of incidental protocols ($\sum EF$) divided by the total units (TU) in the file minus the expected frequency of incidental protocols (full EF). Information technology level. Technical standards, system application technology, data resources, system platform, information network, information security design. Information technology application performance-Operational efficiency, personnel training satisfaction, organizational growth ability,

student service ability, teacher service ability, management service ability. Information management ability, information management mode, informationization organization ability, informationization construction process and system, informationization tool development, system norm. Information technology sustainable development ability. Educational technology training ability, reserve talent training ability, educational technology research ability, educational informationization standard construction ability, capital investment. Opponents argue that relevant observations can be grouped into five other core dimensions. On the basis of expert discussion, the research team made an in-depth analysis of the evaluation dimension and observation index of information barrier protection ability, and concluded that it is difficult to select materials for technical basis and governance basis in the actual evaluation of vocational education informatization standard poles schools. Therefore, the six core dimensions were compressed into five, and 29 observation markers were maintained. At the same time, according to the results of data processing, experts were further asked for their opinions, and three options were set, “approve”, “basically approve” and “disapprove”, so that experts could vote anonymously through “Questionnaire Star”. There were 29 votes from 1 experts, of which the number of approved votes was 21, the basic number of approved votes was 10, and there were no approved votes.

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