Research on Co-construction and Sharing of Higher Vocational Education Information Resources Based on Cloud Computing

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Abstract

Education informationization is mainly reflected in the deep integration of education and information technology, which is manifested in not only the application of information technology in teaching, but also reflected in the intelligent level of the educational information technology. Cloud computing, as an intelligent technology in information technology, maximizes the sharing of information resources with its unique computing method. Based on this, cloud-computing-based co-construction and sharing of higher vocational education information resources has become the main task in the current social development. However, in the current co-construction and sharing of higher vocational education information resources, there are still problems such as insufficient utilization of information resources, imperfect resource sharing mechanism and low information literacy of teachers. Therefore, this paper attempts to construct a cloud-computing-based co-construction and sharing model for higher vocational education information resources, evaluates relevant factors and also establish an internal system correction model for the information resources co-construction and sharing model, in the hope of promoting the exchange and sharing of information resources between colleges and universities.

Keywords: Cloud computing, Information resources, Co-construction and sharing, Model, Research.

1. RESEARCH BACKGROUND

1.1 Literature review

Education informationization technology development has entered the critical transition period. When establishing campus network, higher vocational colleges should recognize the new trend of information technology development and establish online vocational education learning service systems for co-construction and sharing of video technology, platforms, storage and architecture resources (Wang, 2010). The co-construction and sharing of education and teaching resources are the basis for vocational education informationization. In light of the existing issues in the co-construction and sharing model for teaching resources in higher vocational colleges, based on the basic principles for co-construction and sharing, this paper constructs a “quartet” education resources co-construction and sharing model, which can serve as reference for the co-construction and sharing of higher vocational education and teaching resources. In the current environment where cloud computing is rapidly developing, it is necessary to establish an education resources service system for co-construction and sharing of information resources to promote the services in college management departments and achieve the sharing of college resources (Tian, 2016). At the same time, in higher vocational education institutions, in view of the current problems in the construction of teaching resources, building a high-quality educational resources co-construction and sharing platform with advanced information technology is an effective means to study teaching content and methods (Xue et al., 2014). Currently, in the era led by the development of emerging industries, Internet + education have become the main model for the information-based development of higher vocational education resources, so the co-construction and sharing of vocational education information resources have become the focus of research in various fields. (Dong and Su, 2016). If higher vocational education institutions intend to adapt to the rapid development of the information society, they must take the education information construction as the main task and establish higher vocational education information resources sharing models based on actual conditions (Wang and Yin, 2015). The research on local high-quality college information resources co-construction and sharing model should be based on the current situation of local information education resources, and summarize the contents, methods and routes of...
the education resources co-construction and sharing mechanism (Ji et al., 2015). With information-based teaching becoming the current mainstream teaching method, the co-construction and sharing of higher vocational college education resources has become an indispensable method for promoting teaching quality (Yu et al., 2017).

1.2 Research purpose

With the rapid development of information technology and digitalization, the education field is also facing the integration of new topics and network technology (Chen, 2015). Establishing an information resources co-construction and sharing mechanism based on information construction can promote the smooth development of regional teaching (Li, 2010). Establishing an information resources application platform with decentralized storage and centralized management and forming an information resource sharing mechanism for higher vocational education institutions can centralize the different and scattered higher education information resources platforms (Zhang, 2011). Conducting planning, assessment, adjustment and implementation through questionnaire survey, literature consulting and action research methods can promote the co-construction and sharing of educational resources in colleges and universities and effectively solve the existing problems in educational institutions (Li and Shen, 2017). At present, with the progress in the development of educational information courses and the reform of related courses, the co-construction and sharing of educational information resources has become the basic content of fundamental education information construction (Yin, 2007). The main content of educational informationization is the integration of teaching knowledge and information technology, so promoting the co-construction and sharing of information resources in higher vocational education institutions has become an important measure to improve teaching quality (Huang, 2014). In recent years, in light of the difficult integration of higher education resources and data and the poor quality of information resources organization, it has become a key task for higher vocational colleges to carry out co-construction and sharing of teaching resources based on cloud computing (Li and Chen, 2010). Therefore, this paper summarizes the relevant experience of some scholars and studies the co-construction and sharing model for higher vocational education based on cloud computing, which is of great significance.

2. CLOUD-COMPUTING-BASED CO-CONSTRUCTION AND SHARING MODEL FOR HIGHER VOCATIONAL EDUCATION INFORMATION RESOURCES

The cloud-computing-based co-construction and sharing model for higher vocational education information resources takes the association as the core and participated in by both enterprises and educational institutions. Different categories of associations can sort and circulate the information resources in higher vocational education institutions in an orderly manner. There are three categories of associations. 1. On the school organization level, by the institution type, there are associations respectively for education and research institutions and large research institutions. The associations are mainly responsible for developing and implementing relevant standards for institutions and give appropriate guidance and suggestions on enrollment, teaching, specialized course development, quality assurance and administration. 2. On the professional organization level, usually the associations are responsible for developing basic standards for different disciplines like legal education, teachers’ education and engineering education, and carry out information exchange and cooperation. 3. On the individual level, the associations carry out the co-construction and sharing of information resources according to the individuals’ occupations, like administrative staff and teachers. On this level, the associations would develop appropriate professional norms and promote the experience exchange between relevant personnel. In summary, the comprehensive and multi-level integration through associations plays a very important role in the network construction of higher vocational education institutions and is the main order system which the higher vocational education information resources co-construction and sharing model is built on. The information resources co-construction and sharing model for higher vocational education institutions is shown in Figure 1.
According to Figure 1, the information resources co-construction and sharing model between the association and the government, between the association and higher vocational education institutions and between higher vocational education institutions and the government is not built on superior-subordinate relationships but cooperative relationships. The government coordinates the association on the meso level and the higher vocational education institutions on the micro-level through macro policies. During this construction process, the association, on one hand, coordinates with major vocational institutions through various provisions, and on the other hand, serves as the interest representatives of organizations on different levels. At the same time, from Figure 1, it can be seen that, the self-discipline of the association is the foundation for the higher vocational education information resources co-construction and sharing model and can effectively help education institutions improve their competence and quality in personnel organization, courses development and disciplines setup. Of course, the self-discipline of the association does not rely on the maintenance of its own order alone, but also through the self-discipline behaviors of the masses. Moreover, the self-discipline of the association in the information resources co-construction and sharing model also requires the cooperation from organizations at all levels, and if necessary, the legal restrictions on relevant areas. Only in this way can the higher vocational education information resources co-construction and sharing model established run in an orderly manner. The network teaching resources in higher vocational education institutions realizes the sharing of information resources on both free and paid basis. In the model, information resources at different levels are included in the shared resource libraries between vocational education institutions established through exchange, cooperation, alliance and commodity transaction, which realizes the sharing of information resources between institutions and help students, teachers and the public learn relevant knowledge.

3. RESEARCH ON THE CLOUD-COMPUTING-BASED CO-CONSTRUCTION AND SHARING OF HIGHER VOCATIONAL EDUCATION INFORMATION RESOURCES

3.1 Evaluation on the cloud-computing-based co-construction and sharing model for higher vocational education information resources

The “1+1>2” theory proposed by Hermann Haken shows the importance of the co-construction and sharing of higher vocational education information resources. As mentioned above, in the cloud computing service pool, the higher vocational education information resources co-construction and sharing model mainly takes the association as the core and is participated in by both enterprises and educational institutions. In this structure, there exists the synergy resulting from mutual promotion and unity. The synergy model between the subsystems is constructed as follows:

\[ \varphi^i(t_0) = \sum_{j=1}^{n} \omega_j \varphi^j_i(t_0) \]

\[ \varphi^i(t) = \sum_{j=1}^{n} \omega_j \varphi^i_j(t) \quad (1) \]
The above formulas are the degree of order of the subsystem $S^i$ at the time $t_0$ and $t$. Thus, the synergy effect of the higher vocational education information resources co-construction and sharing model can be defined as follows:

$$\mu^{1, 2, 3, ..., n}(t_0, t) = \omega^{(1, 2, 3, ..., n)} \cdot |\varphi^k(t) - \varphi^k(t_0)| \geq 0$$

(2)

where, $\omega =\begin{cases} 1, & \min_{1 \leq k \leq n} (\varphi^k(t) - \varphi^k(t_0)) \geq 0 \\ 1, & \min_{1 \leq k \leq n} (\varphi^k(t) - \varphi^k(t_0)) < 0 \end{cases}$

It can be seen that: (1) at a certain time when $\varphi^i(t)$ is integrated, the total contribution of the order degree of the sub-system $S^i$ is maximized; (2) In the practice of information resources co-construction and sharing, $\varphi^i(t) \in [0, 1]$, and the larger $t$ is, the greater the shared value of the order degree of the subsystem $S^i$ will be. At the same time, the consistency index is used to determine the consistency of information resources sharing. The formula is expressed as follows:

$$CI = \frac{\lambda_{max} - \mu}{\mu - 1}$$

$$CR = \frac{CI}{RI}$$

(3)

When $CI=0$, it means full consistency; when $CI<0.1$, the result is satisfactory, that is, the information resources sharing is maximized.

3.2 Model correction and construction

Based on the above evaluation results, according to the principle of information resources sharing maximum, this paper makes some corrections to the internal system of the cloud-computing-based co-construction and sharing model for higher vocational education information resources, which is shown in in Figure 2.

**Figure 2. Internal System Correction Model of the Information Resources Co-construction and Sharing Model**

According to Figure 2, based on the content of Database Theory and Application, the internal system construction model for higher vocational education information resources co-construction and sharing is mainly divided into two modules - vocational education portal and background operation and management. Vocational education portal includes word search, information resource tag, article recommendation, subject column, resource sharing, reposting & sharing and learners forum, while the background management and operation module consists of content management and routine management. The vocational education portal can be discussed from the following aspects:
(i) Word search

Word search is designed to provide learners with a function or path for them to quickly find the resources they need. Learners only need to enter some keywords, click “search” and then find the corresponding information resource from the search results list.

(ii) Information resource tag

The cloud computing backend sort out the information resources on the platform and then tag them according to the classification results. Later, people will directly see the popularity of relevant information resources according to the font and colour of the tag which are based on the number of visits. At the same time, some tags contain hyperlinks, which are directed to relevant sub-pages, helping searchers acquire resources as quickly as possible.

(iii) Article recommendation

This function is designed to recommend the most popular, latest or random articles or articles of similar topics. The most popular articles are determined based on the number of comments received from users. The latest articles are based on the time and order of the information release. The article recommendation function can also recommend articles that are similar to the keywords, so that the searcher will have more choices in their learning.

(iv) Information resources sharing

Information resources sharing mainly needs to manage and sort various resources in a centralized manner. There are six categories - software, animation, video, image, text and picture resources. The co-construction and sharing of information resources are realized through resources uploading and downloading.

The background operation and management module can be studied from the following aspects.

(i) Content operation and management

According to Figure 2, in the internal system correction model for the information resources co-construction and sharing model, the content operation and management mainly includes functions like article posting, tag management, article search and comment management. Articles can be searched by title, creation time and subject catalogue. The search results can be displayed in reverse order on multiple pages. The searcher can edit, post or delete information according to the search results. When adding article content, the searcher needs to input keywords, titles and upload pictures and content. The fixed links can also be customized. The articles newly added by searchers can be really displayed on relevant websites through posting and other means.

(ii) Routine operation and management

Routine operation and management mainly includes general settings of pages, modules, plug-ins and links. Take plug-in management for example. It includes operations like adding, enabling and removing plug-ins.

4. CONCLUSION

In summary, this paper studies the cloud-computing-based co-construction and sharing model for higher vocational education information resources, analyzes the index system for information resources co-construction and sharing based on internal elements, and then, based on the principle of information resources sharing maximization, establishes an internal system correction model for the information resources co-construction and sharing model. The corrected model can facilitate the sharing of information resources between educational institutions, effectively solve the problems existing in the co-construction and sharing of information resources between these educational institutions, greatly promote the flow and sharing of teaching resources and help students apply relevant knowledge in shared resource libraries. This shows that the higher vocational education information resources co-construction and sharing model has a great development prospect. We believe that in
the near future, the higher vocational education information resources co-construction and sharing model will definitely be widely applied in the vocational college field.

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