Research on the Development Model System of "Integration of Industry and Education" in Colleges and Universities Based on Cloud Computing

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Abstract. With the development of "industry and education integration" in Colleges and universities, the development mode system of "industry and education integration" in Colleges and Universities under cloud computing is constructed. It has changed the traditional mode of education and training, and found a new way to train professional talents.

Keywords: Cloud computing · Industry education integration · Development model

1 Introduction

Cloud computing is a trend of interaction and evolution between cloud computing and traditional industries under the promotion of Internet technology innovation in knowledge society. It is a new form and new format of Internet development under the innovation of computer technology. Cloud computing platform has the characteristics of diversification, wide coverage, high efficiency and low cost, which will produce the reconstruction of learning mode and production mode in various fields of social economy, and create new organizational mode and organizational form.

2 The Impact of Cloud Computing on Higher Education

The development and wide application of cloud computing, especially the mobile Internet technology, provides a new technical means for the modernization of education. It is changing people's learning methods, methods and habits unprecedentedly, and will inevitably lead to profound changes in the mode of private higher education [1]. Through the impact of e-commerce on traditional formats, we can foresee the basic form of the development of private higher education in the future and the opportunities faced by higher education in the era of cloud computing (see Fig. 1).

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Fig. 1. Structure of cloud computing

2.1 The Internet Promotes the Rise and Development of Open Education Resource Movement

The Internet has the characteristics of wide area, cross-border and so on. It can make the dissemination and learning of human knowledge very convenient, and provide a broad platform for the aggregation and sharing of educational resources.

2.2 Internet is an Ideal Way to Realize the Integration of Production and Education in Higher Education

At present, although the traditional university enterprise cooperation in higher education has been greatly developed, through the cooperation platform built by enterprises and schools, enterprises can enter schools and students can enter enterprises, which provides an effective path for the cultivation of high-quality and professional talents in Colleges and universities. In addition to the large-scale private colleges and universities, many colleges and universities hardware scale and teaching staff, faced with uneven investment, trapped in the level of teachers, hardware shortage and policy and other objective conditions, making higher education as a whole of higher education, many high-quality education resources cannot play their due effectiveness. The traditional mode of university enterprise cooperation in higher education has been unable to meet the growing demand of university enterprise cooperation personnel training. Therefore, cloud computing platform based on Internet can become an ideal way for enterprises and schools to cooperate [2]. With the development and innovation of broadband network and mobile Internet technology, anyone who can access the Internet can receive higher education.

In addition, students can choose their own training units according to their own professional learning path and with the help of school enterprise cooperation platform, so as to independently control the learning rhythm and master the necessary vocational skills before entering social work. In this way, it is not limited by time and region, which improves the flexibility and convenience of cultivating talents by the integration of production and education in higher education, and provides the possibility for the professional, professional and personalized talent training of higher education.

2.3 Internet Promotes the Innovation of Teaching Mode in Colleges and Universities

The wide coverage, long distance and high sharing of Internet make knowledge production and communication break through the regional and spatial limitations, which will cause substantial and structural changes in personnel training mode and management mechanism of private colleges and universities, and inevitably lead to the reconstruction of the original curriculum system and teaching system. On the one hand, the new teaching mode only solves the problem that students enter colleges and universities to acquire knowledge in a variety of ways, but it involves the practical mastery of specific professional skills, which cannot be well solved, and the vast majority of professional knowledge remains in theory. In order to solve the problem of professional skills training in the process of personnel training, we can choose the appropriate off campus training base or cooperative units to enter the school "factory" form through the school enterprise cooperation platform built by cloud computing technology to carry out professional and professional talent training.

3 Based on Apriori Algorithm

In this paper, aiming at the massive data in cloud computing environment, the Apriori algorithm of data mining is analyzed and studied. By improving the algorithm, it can be used in MapReduce programming model. Apriori algorithm is a classic algorithm for mining frequent itemsets based on Boolean association rules [3]. It was first proposed by Agrawal et al. The basic principle of the algorithm is to scan the transaction database for many times to calculate the support of the item set, calculate all the frequent itemsets, and then get the association rules. The algorithm is based on two important properties.

Property 1: when k-dimensional data itemset m is a frequent itemset, the necessary condition is that all $k-1$-dimensional subsets are frequent itemsets.

If $m-2$ is not a frequent subset, then it is not frequent. Algorithm process:

(1) The frequent itemset L1 is obtained by scanning the transaction database. If L1 is not empty, L1 will join and prune to generate candidate set C2 with length of 2;
(2) Then all subsets CL of each transaction in the transaction database in C2 are calculated, and all candidate itemsets with length of 2 in CT are counted and added with 1.
(3) After scanning the transaction database, find all the itemsets whose count is not less than the minimum support in the candidate set C2, and obtain the frequent two item set L2.

(4) Loop the above steps to process the newly obtained frequent item set. When no frequent item set is generated, the loop is terminated.

The algorithm is described as follows:
Input: D (transaction database), min_Sup (minimum support)
Output: l (all frequent itemsets in transaction database d)
The specific algorithm is as follows:
L1 = find_frequent_I-itemsels (D); // find the L1 set of frequent 1 itemsets
For k = 2;Lk − 1 ≠ φ;k++
{G = apriori_gen (LK − 1); // connect k − 1 with itself to generate candidate k itemset Ck
For each transaction t ∈ D // scans D for counting
{Ct = subet (Ck,t,); // candidate set
For each candidate c ∈ Ct
c. count+ +; // counter plus 1
Lk = (c ∈ Cklc.count ≥ min_sup) // all frequent itemsets with minimum support
Return L = {all LK} // find the set L of all frequent sets. Through the algorithm process, it is not difficult to see that Apriori algorithm needs to traverse the transaction database multiple times. For example, if the database with massive data is operated, it will cost a lot of computing time and memory space, and the I/O load is very large. Cloud computing has the characteristics of parallel distribution. By improving Apriori algorithm and applying it to cloud computing environment, the efficiency of data mining can be improved according to the parallelism of cloud computing.

4 Reform Strategy of Industry Education Integration Education Mode in Colleges and Universities Under the Condition of Cloud Computing

The trend of deep integration of cloud computing technology and education is irreversible. Colleges and universities should systematically plan, actively explore the development path of higher education industry education integration under the background of cloud computing, and vigorously promote the informatization development of school enterprise cooperation in private colleges and universities.

4.1 Actively Promote the Comprehensive Application of Information Technology in Teaching Practice

On the basis of teaching practice, we should build our own information platform for school enterprise cooperation. Through the construction of a network platform for school enterprise cooperation with rich content and convenient use, the school enterprise two-way selection of on-line and off-line is planned to be pilot, and the design of learning situation design and teaching resources is carried out, so as to gradually realize the integration of “teaching and doing”.

4.2 We Should Choose the Best and Organize Network Resources Seriously

The university enterprise cooperation network platform based on cloud computing helps to show the characteristic specialties of private colleges and universities, increase the popularity of enterprises, expand the popularity of school enterprise cooperation platform, and guide more schools and enterprises to participate. Thus, in the teaching process, private colleges and universities can further cultivate talents suitable for the needs of the society, make students feel the learning atmosphere of "learning for practical use and specialized in technology", and further improve students' learning enthusiasm. Therefore, on the basis of teaching practice, the school should timely push out its strongest, most advantageous and characteristic mature teaching methods and methods on the network platform [4–6]. The success of school enterprise cooperation network platform lies in its efforts to provide students with the best courses and personalized learning services. This requires schools to choose carefully, teachers to prepare carefully, scientific design, need to revise the traditional curriculum teaching mode and system structure to adapt to the new requirements of production teaching integration.

4.3 Innovating Incentive Mechanism and Strengthening the Construction of Teaching Team

The teaching mode of integration of production and teaching is not the unilateral behavior of schools or enterprises, but requires the joint efforts of schools and enterprises to build a professional teaching service team to cooperate with each other, especially in the training of "double qualified" teachers. Theoretical knowledge can be explained thoroughly in class, and design operation and demonstration can be completed skillfully in the training field. Private colleges and enterprises should actively promote the construction of curriculum team, build incentive mechanism to encourage teachers to participate, support and promote teachers to enter the production practice line, constantly improve practical skills and improve their own knowledge system. We can create a teaching service system based on cloud computing platform to promote the specialization and integrated management of teachers, and transform teaching from individual labor to team cooperation (see Fig. 2).

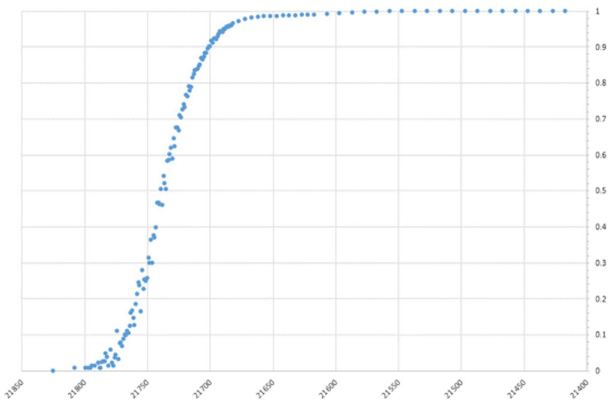

Fig. 2. Simulation of individual labor to team cooperation

4.4 Innovating the Management System of Private Higher Education

The development of the teaching mode based on cloud computing platform will bring impact on the current higher education teaching system, and will cause the deconstruction and reconstruction of the relationship between the school-centered management mode and the enterprise centered management mode. Under the current school enterprise cooperation management system, the "factory in school" between private colleges and enterprises in China makes it impossible for enterprises to effectively supervise and control, resulting in the students' practice process being basically isolated and closed from the outside world, resulting in the disconnection of learning content and external demand, making cars behind closed doors, and serious waste of teaching resources. In addition, the "factory out of school" school cannot be effectively managed, resulting in the students' practical teaching and theoretical teaching cannot be unified – resulting in the formation of university talent knowledge system [7–9]. Therefore, in the face of the historical development opportunities in the Internet era, enterprises and colleges and universities should fully understand and attach importance to it from a strategic height, and speed up the fundamental reform of university teaching mode and management system (see Fig. 3).

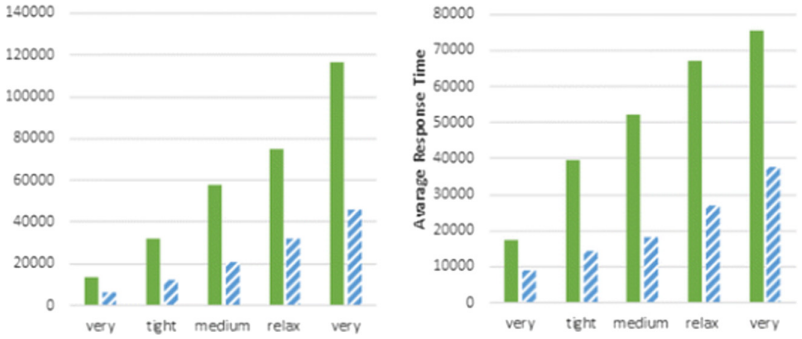

Fig. 3. Number of university teaching mode and management system

5 Judgment on Symbiosis Phenomenon of "Going Out" of School Enterprise Cooperation in the Integration of Industry and Education

5.1 University Foreign Investment Collaboration

As for the social phenomenon of collaborative going out between colleges and foreign investment enterprises, we should first study and judge their main qualitative parameters (the factors that determine the internal nature and its changes. Only when the qualitative parameters are compatible can there be a symbiotic relationship between colleges and foreign investment enterprises as symbiotic units, Since the start of the "double high"

construction and quality improvement and excellence training plan of colleges and universities, especially vocational colleges, under a series of forward-looking, overall and systematic top-level designs of the government, the vitality of colleges and universities has been stimulated, and the improvement of internationalization level is undoubtedly one of the connotation construction of high-quality development, Through international exchanges and cooperation, foreign aid, study in China, standard education, overseas education and other forms, we can test the comprehensive strength of running a school from the perspective of internationalization, show and radiate the construction achievements in a wider world, and serve the social and economic development. As shown in Fig. 4, in this era, Chinese enterprises are required to start early and make great contributions in the process of going out, However, we should also be soberly aware that enterprises not only face external business environment risks, but also have problems such as cross-cultural identity conflicts, inconsistent professional standards, lack of overseas applied technical talents, etc. These objective realities restrict the cross-border investment of most enterprises to a certain extent and cannot achieve the expected results. Through the successful practice of some enterprises going out.

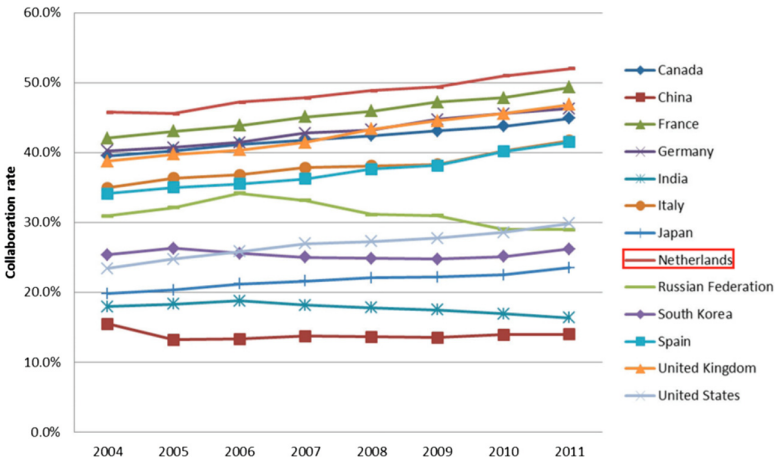

Fig. 4. The cultivation of talents in colleges and universities

5.2 The Cultivation of Talents in Colleges and Universities

Colleges and universities, especially vocational colleges, cultivate high-quality management and application-oriented talents that enterprises urgently need overseas. Overseas projects of enterprises can provide colleges and universities with practice places and guidance for students, and both sides can adapt to each other in the supply and demand of human resources and talent training [10]. The majors of effective schools basically cover all fields of national economic development, Both sides adapt to each other in terms of industrial structure and industry demand; colleges and universities gather high-quality educational resources and technological innovation capabilities, which not only provide

intellectual support, technical support and innovation support for enterprises' overseas development, but also strengthen and highlight the international level and comprehensive strength of the school itself, so that both sides can achieve win-win in resource sharing. Under the specific conditions of "going out", it is imperative for colleges and universities to cooperate with foreign investment enterprises. The main quality parameters of colleges and universities can choose the international level, and the main quality parameters of foreign investment enterprises can choose the cross-border investment level [11–13]. The two are compatible and interact with each other. The integration of industry and education between colleges and foreign investment enterprises reflects a symbiotic phenomenon and has a symbiotic relationship.

6 Characteristics of Industry Education Cooperation Between Universities and Foreign Investment Enterprises

Based on the quantitative and qualitative analysis of the symbiosis degree, symbiosis coefficient, collaborative behavior and organizational model between universities and foreign investment industry, it is found that "universities have the following collaborative characteristics".

6.1 The Overall Development is Positive, the Participation of All Parties is Unbalanced, and the Ecosystem in the Symbiotic System is Single

From the perspective of initiative, colleges and universities are more active than enterprises. From the perspective of symbiotic units or individuals, the initiative of higher vocational colleges is stronger than that of ordinary colleges, and that of private enterprises is stronger than that of state-owned enterprises; "the participation degree of double first-class and double high colleges is higher than that of other colleges, and the participation degree of energy, manufacturing and infrastructure enterprises is higher than that of other types of enterprises; the cooperation of colleges with strong industry background started earlier, Enterprises with obvious industrial advantages need more cooperation. According to the types of symbiotic units, the government and industry organizations have influence in some areas, but the overall participation is low, and they have not played their due role in the symbiotic system.

6.2 The Modes are Diversified in Form and Degree, and the Profits of All Parties are Asymmetric, Tending to Integration

The cooperation of foreign aid training, overseas guidance or training should be based on the needs, and the main input of the school and the beneficiary is the enterprise; the cooperation between the school and the enterprise includes modern apprenticeship training, entrusted directional talent training, school enterprise joint education base, school enterprise joint development of professional or technical standards, joint scientific research and so on, However, the public welfare nature of most schools determines that their investment is the main one and the harvest is the auxiliary one, while the market nature of enterprises determines that their investment is less and efficiency is

the most important one. The school enterprise joint construction of overseas school running entities requires schools and enterprises to build together for a long period of time, and joint investment and win-win results for each other [14–16]. The school's high enthusiasm for cooperation is faced with the hesitation of most enterprises, but the demands of overseas diversified operation and talent localization urge a small number of enterprises to test the water first, and take the evolutionary steps towards integration.

6.3 The Symbiotic Environment has Changed, the Reactions of All Parties are Inconsistent, and it is Evolving for a Period of Time in the Process of Adjustment

Since then, the international situation has been complex and changeable, with many uncertain factors. There are differences in risk prevention of "going out". Due to the sensitivity of the market to the market, the enterprises' ability to anticipate and guard against the risks is stronger than that of the schools. Most of the whole industry's overseas investment is in a country with good business environment or a very profitable industry area. Since, most enterprises in China have fully demonstrated the risk resisting ability of the enterprises in the host country. However, the international education field has been greatly impacted by the recent international epidemic. The offline operation of studying in China, running schools abroad and international exchange projects has basically pressed the pause button [17–20]. Although the online mode has been expanded, its effect needs to be comprehensively evaluated.

7 Conclusions

In short, the sustainable development of the teaching mode based on cloud computing platform needs not only the active participation of colleges and universities as educators themselves, but also the internal reform of the education system itself. With the rapid development of cloud computing technology, the education mode of integration of production and education will be more diversified, professional and personalized, so that learners can acquire high-level technical knowledge, and schools and enterprises as providers can obtain enough sustainable development power.

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