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Characteristic Analysis of Integration of Enterprises With Vocational Schools and Universities Based on Data Fusion Algorithms

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The basic concept of Web education resource QoS refers to the combination of availability, security, response time, and throughput-related attributes of a service. The solution uses QoS as feedback data to monitor and handle dishonest service providers and users, which effectively improves the success rate of service selection. Therefore, starting from the measurable and combinable nature of Web education resources, we establish a universal evaluation system for the credibility measurement of educational resources according to the diversified needs of educational subjects, and improve the accuracy of the acquisition of educational resources. Taking social demand as guidance, it plays a vital role in cultivating applied talents through the integration of production and education. The goal of training talent of local colleges and universities is to serve enterprises, service places and industry. Based on the background of the integration of production and education, this paper introduces the idea of mathematical modeling to carry out module teaching to colleges and universities, train talent in accordance with the market demand, and impart knowledge in accordance with the need of the operating post, which gives equal emphasis to ability training and the imparting of professional knowledge.

Keywords: Semantic similarity filtering; Deep learning; Module teaching;Simulation analysis

1. INTRODUCTION

With the development of China's economy and society and the implementation of the strategy of innovation driven development, the relationship between the supply and the demand of talent has undergone profound changes [1]. In the face of the economic restructuring and the accelerated pace of industrial upgrading, the structural contradictions in the carrying out of higher education have become also more pronounced [2]. The problem of the difficulty in employment of graduates has not been relieved as the number of graduates grows year by year [3-4]. The training mechanism of applied, compound and innovative talents in the first line of production service has not been completely established [5]. The structure and quality of talent training are not yet fully adapted to the requirements of the economic structural adjustment and industrial upgrading [6-7]. In the fourth session of the twelth National People's Congress (NPC), the transformation of ordinary undergraduate colleges and universities with conditions to the application type was mentioned [8]. Yuan Guiren, Secretary of education, stressed that local universities should take the lead in transformation, aiming at training applied

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skilled talents for adapting to economic transformation and local economic and social development [9]. Under the background, in order to actively adapt to China's economic development and enter the new normal, and actively integrate into industrial transformation and upgrading and innovation driven development, local engineering colleges need to further transform their school operation ideas to serve local economic and social development [10-12]. Through the cooperation between school enterprises and the integration of production and education, one can cultivate applied technology skilled talents, and comprehensively improve the ability of schools to serve the regional economic and social development and innovation driven development, serve production enterprise technology, and create value for learners [13]. Therefore, one of the main problems to be solved in the transformation of universities is the deep integration of production and education. The cooperation between school and enterprise and the integration of production and education are the only way to train applied skilled talents [14]. Whether from the strategy level of national development or from the level of social demand for talents, as the backbone of the popularization of Higher Education, the transformation and development of local engineering colleges to applied technology colleges and universities is an inevitable trend.

2. PREVIOUS RESEARCH ON THE INTEGRATION OF PRODUCTION AND EDUCATION

2.1 Semantic Similarity Filtering

The similarity calculation of resource semantics calculates the degree of similarity between the intrinsic meanings of two resources. It has been widely used in information integration [15], information recommendation and filtering [16], data mining and other fields, and has become a hot spot in information technology research today. Moreover, there are many different methods for calculating similarity, such as cosine formula, Pearson correlation coefficient, and conditional probability [17]. The following related definitions are given for the semantic similarity calculation of Web education resources.

A set of Web education resources

$$E = \{e_1, e_2, \ldots, e_i, \ldots., e_n\}$$

of different types and versions are employed as a set of resource screening objects.

In the Web education resource,after the feature extraction of the Web education resource, the feature item set $E = \{e_1, e_2, \ldots, e_i, \ldots., e_n\}$ is obtained. The vector resource of e_i can be expressed as $Vi = \{w_1, w_2, \ldots, w_i, \ldots, w_n\}$ and is defined as follows

$$w_i = \alpha \times \frac{f(f_i, e_{th})}{\sum_{i=1}^{n} f(f_i, e)} + \beta \times \frac{f(f_i, e_{td})}{\sum_{i=1}^{n} f(f_i, e)} \quad (1)$$

w_i is the weight on feature item f_i.

Among them, $f(f_i, e_{th})$ is the word frequency of the f_i of feature item in the Web educational resource the (Web Education Resource Name or Title) e_{th}, $\sum_{i=1}^{n} f(f_i, e)$ is the word frequency of all feature items in Web Education Resource e_{th}. The α factor represents the importance of the feature vector in the name or title of the Web education resource, and the β factor represents the importance of the feature vector in the body text of the Web education resource, and $\alpha + \beta = 1$. This weight vector represents the extent to which the feature is important in the resource.

For Web education resources, concentrate resources e_1 and e_2, there are

$$sim(e_1, e_2) = \frac{\sum_{i=1}^{n} w_{1i} \times w_{2i}}{\sqrt{\left(\sum_{i=1}^{n} w_{1i}^2\right)\left(\sum_{i=1}^{n} w_{2i}^2\right)}} \quad (2)$$

$sim(e_1, e_2)$ is their resource similarity. Among them, w_{1i} is the weight of feature item f_i in the web education resource e_1, and w_{2i} is the weight of feature item f_i in the web education resource e_2. Among them, $sim(e_1, e_2) \in (0, 1)$, if $e_1 = e_2$, then $sim(e_1, e_2) = 1$. The level of semantic similarity between Web educational resources represents the degree of similarity between the two resources.

Firstly, a semantic similarity-based filtering algorithm HA_SA is adopted, which mainly considers two aspects namely: (1) How to calculate the weight of the sub-feature vector in the resource according to the feature vector extracted from the resource; (2) How to calculate the semantic similarity between two Web educational resources to filter resources. Due to the heterogeneity and large size of Web education resources, the problem has become more complicated.

The algorithm uses the vector space model to filter the Web education resources, quantizes the resources into a set of feature vectors, and separately counts the word frequency of the feature vector in the resource name (title) and text, and calculates the weight of the feature vector. Finally, the similarity between the two Web education resources is calculated according to the cosine formula. The process of learning each agent is described as a quad (A, R, N, λ). A represents the action, R represents the reward value, N represents the degree of satisfaction, and the threshold λ represents the extent to which the learning process needs to be achieved. During the learning process of the user agent, the return value is continuously returned, and the filtering mechanism of the resource is determined according to the size of the reward value. Moreover, the traditional Q learning algorithm is used in the paper for subject learning.

The Q learning algorithm strategy uses the value of the state-action pair (s, a) to estimate the function (Q value). In the Q learning process, the Agent learns according to the Q function and does not need to wait for the task to complete. The update formula is as follows:

$$Q(s_t, a_t) \leftarrow Q(s_t, a_t) + \alpha r_{t+1} + \gamma \max Q(s_{t+1}, a_t) - (s_t, a_t) \quad (3)$$

A domain U and a mapping $U_A \quad U \quad 0 \rightarrow 1$ from U to 0, 1 are given. Assuming $A = \{u_A(u) | u \in U\}$, then it is called A

as a fuzzy set on the domain U. Function A is a membership function of fuzzy set A on the universe U, and $u_A(u)$ is the membership of u for fuzzy set A. The membership function is defined as

$$u_A(u_i) = \frac{N(u_i)}{\sum_{0 \leqslant j \leqslant n} N(u_j)} \tag{4}$$

Among them, u_i is the set of words representing the educational resources or the content to be queried, n is the number of u_i, $N(u_i)$ is the number of u_i in the educational resources, and the value of $u_A(u_i)$ is the membership of u_i to the fuzzy set A.

Euclid ambiguity determines the content of the query by membership and can represent the degree of fuzzy relevance of educational resources. Euclid ambiguity is defined as:

$$d(A) = \frac{2}{\sqrt{n}} \sqrt{\sum_{i=1}^{n} |u_A(u_i) - u_{A0.5}(u_i)|^2} \tag{5}$$

$$u_{A0.5}(u_i) = \begin{cases} 1, u_A(u_i) \geqslant 0.5 \\ 0, u_A(u_i) < 0.5 \end{cases} \tag{6}$$

The Rank algorithm based on fuzzy sets can be expressed as:
Input: $Q = \{q_1, q_2, \ldots, q_s\}$; //User query content
$W_Q = \{W_{q^1}, W_{q22}, \ldots, W_{qs}\}$; // The proportion of users querying content
Output: γ_f; // Sorting results of educational resources after finding by fuzzy set theory
BEGIN
for er1 to ern
{
$U =$ $\{u_1, u_2, \ldots, u_s\}$
Extract
For u_1 tou_t
$u_A(u_i) \leftarrow N(u_i) / \sum_{0 \leqslant j \leqslant n} N(u_i)$
The membership degree of the keyword $d(\sigma_i) \leftarrow \frac{2}{\sqrt{s}} \sqrt{\sum_{t=1}^{S} |u_A(q_i) \times w_{qi} - u_{A0.5}(q_i)|^2}$; Use r search content can blur the ambiguity of er_j educational resource.
$\gamma_f \leftarrow \alpha a(er_j)$
Return γ_f
}
End

2.2 The Technical Features of Integration of Production and Education

"Production and education" can be understood as "production and education", in which production (including service and operation) is an important form of vocational education and teaching, it focuses on the practical situation of teaching. "Teaching" focuses on the learning of knowledge content and skills and methods. The integration of production and education is an organic whole which is formed by the integration of the industrial system and the educational system. Specifically speaking, the integration of production and education is the education sector (mainly colleges) and industry sector (industry, enterprise) in the field of society, fully rely on their respective advantageous resources and advantages, based on mutual trust and contract, taking the transformation of service economy and meeting demand as the starting point, taking the cooperative education as the core, taking the cooperation and win-win power as motivation, taking the cooperation between school and enterprise as the main line, taking the project cooperation, technology transfer and joint development as the carrier, taking the cultural communion as the supporting industry, it is the optimal combination and high fusion of all elements within education, and a kind of economic and education activity way that each participant is cooperating with each other.

2.3 The Technical Features of Module Teaching

A module often describes the combination of teaching activities addressing a topic or content. In other words, a module is a teaching unit that is self-contained in content and time, with credits, detectable and a limited content. It can be composed of different teaching activities. The module contents include a single course, a combination of knowledge points for a number of related courses, an experimental course, or an internship, the combination of theoretical courses and practice, a teaching unit that surrounds a particular subject or content. The module is designed at the starting point of the application ability. When a student has finished a module, he/she should be able to acquire the ability of relevant aspects. Changing from the "what content I want to teach" of the knowledge idea of Input-Orientation to "what ability students should acquire through learning" of the teaching idea of Output-Orientation.

The traditional teaching and module teaching have great differences in their education idea. This difference is the embodiment of the tendency of education beyond the tool and the tendency to promote human development. The change of the macro concept will inevitably lead to the corresponding changes in the various elements of the curriculum. At the same time, there are great differences between the traditional course and module courses in many elements of the course. From the perspective of modern education, module teaching is no doubt more consistent with the requirements of modern society. As shown in Table 1, there is a contrast between the traditional teaching and the module teaching idea. The comparison of the elements between the traditional teaching and the module teaching is shown in Table 2.

CNKI is currently the most authoritative academic literature database in China. It not only has the powerful function of searching paper, but also can obtain the attention of the scholars on a certain problem through the keywords in the past of a period of time. In the key words of CNKI, the author typed "modularized teaching" and obtained the research change trend chart of modularized teaching in the past 16 years from 2000 to 2016. As shown in Figure 1.

Table 1 Comparison between traditional teaching and module teaching idea.

Traditional teaching	Module teaching
Know what it is	Knowing what it is and why it is
Theory is more important than practice	Theory and practice are equally important
Concentrate on Education	Comprehensive education
Teacher centered	Student center
Transferring knowledge	Getting knowledge
Education plan	Researching plan
Teacher guidance and teaching	Teachers' assistance, encouragement, assessment

Table 2 Comparison between elements of traditional teaching and module teaching.

Index	Traditional teaching	Module teaching
Evaluation of learning	Subjective evaluation of Teachers	Objective evaluation of the indicators, students can clearly know how and when to get the results of learning
The process of learning	Teacher orientation, paying attention to the role of teachers.	Student orientation, emphasis on student activities.
Results of learning	Some students are excellent, and some students fail.	All students can succeed in their own planning.
Learning goals	It will not be announced in advance in general	It is announced before the start of the course
The state of learning	passive	Aggressiveness
Teaching organization	Collective class, predefined	Highly individualized learning, students can have independent class time, place, etc.
The role of Teachers	Imparting knowledge	Assess, guide learning, motivate, and provide resources
The examination of the course	Grade evaluation of the whole course study	Assessment of learning goals and assessment of essential skills

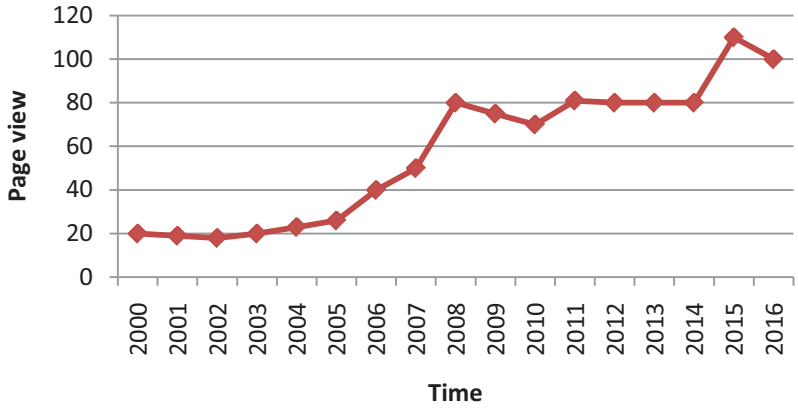

Figure 1 The trend of module teaching research.

3. THE CONSTRUCTION OF THE MODULAR TEACHING SYSTEM IN COLLEGES AND UNIVERSITIES UNDER THE INTEGRATION OF PRODUCTION AND EDUCATION

3.1 The Construction Idea of Teaching System

"The internal structure of the course is composed of course objectives, course content, the way of learning activities and evaluation." The course content is the core element of the course composition, and also is the organic component of the internal structure of the course. It can be said that without the course content, the course is also impossible to talk about. The construction idea of module teaching content is mainly based on the thought model of mathematical modeling. First of all, the curriculum objectives are determined, and the module teaching content is constructed under the guidance of the curriculum objectives. The construction of module teaching content mainly includes the organization of the content of module teaching and the construction of the content system.

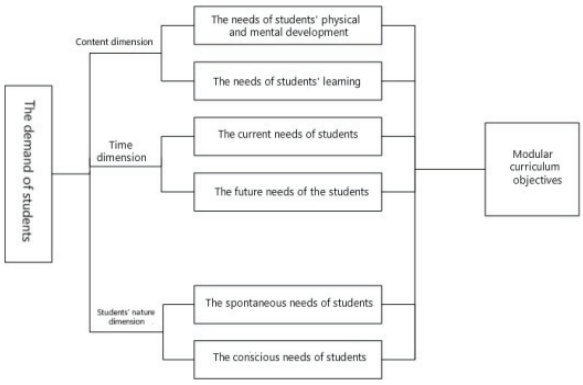

Figure 2 An analysis on the source of students' needs.

The integration of mathematical modeling ideas into classroom teaching is a good embodiment of the theory of constructivism. It embodies teachers' inspiration and guidance for students to use mathematical knowledge and solve new practical problems through a series of processes. Here, the students' mathematics learning is a process of reproduction and recreation of knowledge. When the idea of mathematical modeling is integrated into teaching, students are no longer passively accept the ready-made knowledge of books, but from the reality of life, they get the experience of active learning through observation, thinking, comparison, solution and examination. In this process, the students produced effective knowledge transfer behavior, made good use of the knowledge that they have learned, and incorporated the new knowledge experience into the existing cognitive structure, and completed the process of knowledge building. At the same time, under the guidance of mathematical modeling idea, students' thinking activities have been fully embodied in the process of learning. Teaching this thought way to the students is of great significance to the realization of quality education and the realization of the all-round development of the students. Based on the view of integration of production and education, this paper introduces the idea of mathematical modeling in the module teaching of colleges and universities. What kind of talent is needed for the enterprise, we will carry out what kind of teaching to export the talent that the enterprise wants.

3.2 The Establishment of the Goal of the Teaching System

The value orientation of "student oriented" in modular teaching is a response to the idea of curriculum reform in Colleges and universities. "Making every school succeed and make every student succeed is the basic idea of this curriculum reform". Such values idea will fully respect the diversified development needs of students in the specific links of curriculum design and reflect a high level of humanistic concern.

The goal of teaching comes from two aspects, students and enterprises. Students are the main body of curriculum learning, and the enthusiasm and initiative of the students' participation are the important guarantee for the success of the module curriculum. As shown in Figure 2, it is an analysis of the source of the students' needs. From the point of view of the enterprise, the employment purpose of the enterprise is to maximize the interests. Therefore, from the angle of integration of production and education, we can understand the needs of the enterprise and determine the course goal.

3.3 The Selection of the Course Content of the Teaching System

The concept of goal-oriented content gives schools and teachers greater freedom to choose the content of the curriculum. Therefore, how to choose the content of module teaching scientifically under the guidance of the target has become an important topic. The connotation of content of the course is mainly manifested as follows: First of all, not all experience can become a curriculum content. Only the educational experience that can promote the overall development of the students' body and mind can produce the course content. Second, direct experience is the sum of knowledge and skills directly related to the real life of the students. This kind of experience is more complex and needs to be refined and processed can get into the course. The curriculum required by the enterprise is a very practical course, and the direct experience occupies an important position in the content of the course.

4. THE APPLICATION CASE OF THE TEACHING SYSTEM

4.1 An Introduction of the Actual Case

Taking a university as an example, in order to respond to the national call, the University started the teaching policy of cultivating applied talents and module teaching of production and education since 2006. By the end of June 2016, 6 provincial technical demonstration centers had been set up in the school, there are "digital media experimental teaching center", "automobile experimental teaching center", "digital art experimental teaching demonstration center", "civil engineering experimental teaching center", "fermentation engineering experimental teaching center", "computer

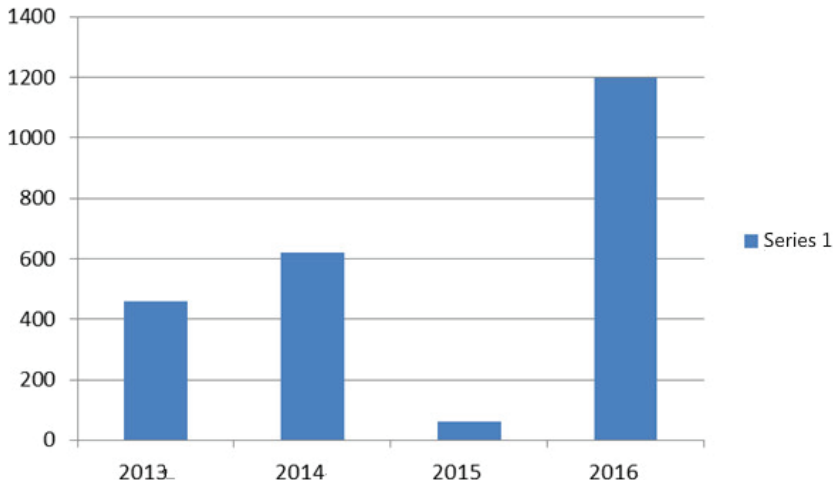

Figure 3 The situation of the use of funds.

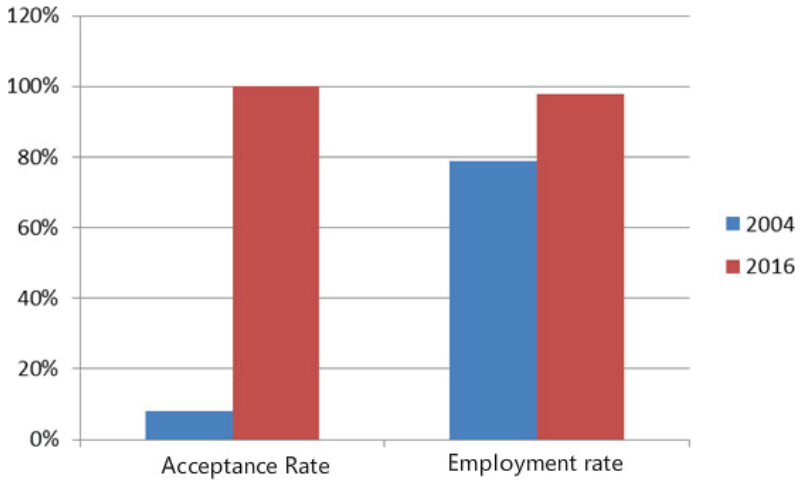

Figure 4 The acceptance rate and the employment rate.

comprehensive training experiment center" respectively. And it also has an internship and learning cooperation program in 165 large enterprises and scientific research institutions in China.

4.2 The Experimental Conclusion

With the continuous promotion of the cooperation alliance between school and enterprise and the module teaching and the solid development of the work, the achievements of a university in the field of production, learning and research are very significant. Meanwhile, the school research team has participated in and developed more than 90 national and provincial scientific research projects, which has earned about twelve million yuan for schools and enterprises. And it is expected that the economic benefits can reach up to 100 billion yuan, and the amount of money that directly affects the teaching system of the integration module of production and education is also increasing. As shown in Figure 3, it is the case of financial analysis.

Since a higher school has been upgraded in 2004, a higher university has seized the opportunity of the transformation and upgrading of the economic industry in a certain place, focusing on the module teaching. When a university has tasted the sweetness of the module teaching of integration of production and education in the transformation and development, in the enrollment and employment of the school, there is a good situation in which the enrollment is hot and the employment is smooth. Taking the case of undergraduate enrollment and employment situation in 2016 as an example: the enrollment rate of the first volunteer of undergraduate course was increased from 8% in 2004 to 100%, and the employment rate of graduates rose from 79% in 2004 to 98%, it can be seen that a university has persisted in the school-running model of the modular teaching system of integration of production and education for many years, and explored a new idea of transformation and development of local engineering colleges. Its teaching mode has featured the characteristics of local engineering colleges and has established its own brand and has been at the forefront of the transformation and development of the national local engineering universities. It has played a very good exemplary role for the transformation and development of other local engineering colleges. As shown in Figure 4, the enrollment rate and the employment rate of graduates are shown.

4.3 The Strategy and Suggestion of the Modular Teaching System

(1) Popularizing modularization in the range of colleges and Universities

In colleges and Universities, an isolated module suitable for a particular major will lead to problems that are incompatible with other professions. The establishment of a new system should be carried out throughout the school and should be implemented across departments and across schools, and it can be implemented in similar specialties in other schools.

(2) Unified module size

In a program of talent training in a major, in the flexible combination of modules in the process of interdepartmental cooperation, it must be based on the compatibility of modules in different specialties.

(3) Classification of professional modules of different types

What knowledge and ability will be taught will be determined by professional designers.To this end, from the overall "modular pool" of a school, the selection of a very important module for a particular major should be able to be divided into different categories.

5. CONCLUSION

In the view of the need for integration of production and education, the module teaching structure can better adapt to the changes in the social and economic development and meet the needs of the enterprise. For a university, which is often faced with increasing pressure of competition and plagued by limited resources, it is necessary for it to concentrate on its own advantages. The flexibility of the teaching arrangement can also meet the need of continuous strengthening of interdisciplinary studies and internationalization. The modularization also makes it more convenient for interdisciplinary courses to be opened and for inviting visiting professors at home and abroad to open the class. Based on the background of the integration of production and education, this paper analyzes the construction of the module teaching system in Colleges and universities. Finally, the effectiveness of the teaching system is verified by a case study. Therefore, the research of this paper has promoted research on the integration of module teaching and the integration of production and education.

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REFERENCES

1. Bing-You R G, Blondeau W, Dreher G K, et al. T2 (teaching & thinking)-in-action skills of highly rated medical teachers: how do we help faculty attain that expertise, *Innovations in Education & Teaching International,* 2015, 54(5):. 409–417.
2. Cook D, Su Z, Yang Y. envlp: A MATLAB Toolbox for Computing Envelope Estimators in Multivariate Analysis, *Journal of Statistical Software,* 2015, 062(8): 1–20.
3. Fei Y, Lin H, Yang D. Using scenario-simulation in the clinical teaching of surgery, *China Higher Medical Education*, 2015.
4. Glowacki K. Modular intermodal transport container, frame support and system of use, 2015.
5. Joksimović S, Gašević D, Loughin T M, et al. Learning at distance: Effects of interaction traces on academic achievement, *Computers & Education*, 2015, 87: 204–217.
6. Liu D M. Application of CDIO mode to the teaching of C Programming Language, *Journal of Liaoning Teachers College*, 2015.
7. Mike Wright, Bart Clarysse, Andy Lockett, Mirjam Knockaert. Mid-range universities' linkages with industry: Knowledge types and the role of intermediaries, *Research Policy*. 2008 (8).
8. P. D'Este, P. Patel. University–industry linkages in the UK: What are the factors underlying the variety of interactions with industry?, *Research Policy*. 2007 (9).
9. Porubän J, Bacíková M, Chodarev S, et al. Teaching pragmatic model-driven software development, *Computer Science & Information Systems*, 2015, 12(00): 22–22.
10. Xia L, Xiao-Hui Y U, Han J, et al. Design of motion control system of industrial robot based on UMAC, *Journal of Hefei University of Technology*, 2015.
11. Xu H, Liang D. A Comparative Study of German Competency-based Learning Fields and Australia Competency-based Training, *Vocational & Technical Education*, 2015.
12. Sun K., Yan D., Hong T. (2014). Stochastic modeling of overtime occupancy and its application in building energy simulation and calibration. Building & Environment, 79 (5), pp. 1–12.
13. Liu F., Zhou Z. (2015). A new data classification method based on chaotic particle swarm optimization and least square-support vector machine. Chemometrics & Intelligent Laboratory Systems, 147 (15), pp. 147–156.
14. Kabalci Y. (2016). A survey on smart metering and smart grid communication. Renewable & Sustainable Energy Reviews, 57, pp. 302–318.
15. Schleich J., Faure C., Klobasa M. (2017). Persistence of the effects of providing feedback alongside smart metering devices on household electricity demand. Energy Policy, 107, pp. 225–233.
16. Diamantoulakis P., Kapinas V., Karagiannidis G. (2015). Big data analytics for dynamic energy management in smart grids. Big Data Research, 2 (3), pp. 94–101.
17. Irfan M., Iqbal J., Iqbal A., Iqbal Z. (2017). Opportunities and challenges in control of smart grids–Pakistani perspective. Renewable & Sustainable Energy Reviews, 71, pp. 652–674.