Research on English Teaching Ability Evaluation Algorithm Based on Big Data Fuzzy k-means Clustering

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Abstract. Aiming at the problem of inaccurate classification of big data information in traditional English teaching ability evaluation algorithms, an English teaching ability evaluation algorithm based on big data fuzzy k-means clustering and information fusion is proposed. Firstly, the constraint parameter index analysis model is established; secondly, the quantitative recursive analysis method is used to evaluate the ability of big data information model, and the entropy feature extraction of the ability constraint feature information is realized; finally, the big data information fusion and K-means clustering algorithm are integrated to realize the index parameter clustering and integration of English teaching ability, and the corresponding teaching resource allocation plan is compiled, To realize the evaluation of English teaching ability. The experimental results show that this method has better ability of information fusion and analysis, and improves the accuracy of teaching ability evaluation and the efficiency of teaching resource application.

Keywords: Big data · English teaching · Teaching ability evaluation · Information fusion · Data clustering

1 Introduction

Using information processing technology and big data analysis technology for teaching evaluation and resource information scheduling is of great significance to improve the quantitative management and planning ability of teaching process. Therefore, this paper studies the evaluation of English teaching ability based on big data analysis. Because there are many restrictive factors in English teaching ability evaluation, it is necessary to test and analyze English teaching level, construct parameter model and big data analysis model that restrict English teaching level, adopt big data information fusion and clustering processing method to evaluate English teaching ability, and construct objective function and statistical analysis model of teaching ability evaluation, Improve the quantitative prediction ability of English teaching ability evaluation. This paper proposes a method of English teaching ability estimation based on big data fuzzy k-means clustering and information fusion, which realizes the clustering and integration of index parameters of English teaching ability, compiles the corresponding teaching

resource allocation plan, realizes the quantitative planning of English teaching ability evaluation, and realizes the accurate evaluation of English teaching ability.

The evaluation of young teachers' teaching ability is an important part of teachers' management and training. Evaluation needs to start from the qualification, ability and performance of teachers. The growth of young teachers often needs to go through such stages as "adaptation stage", "formation stage of basic teaching skills", "accumulation of experience and skills", and the growth process has a certain ladder. Our school covers a variety of disciplines, such as science, engineering, business and art, and the requirements of each discipline for teachers are different. Therefore, the evaluation standards of young teachers' teaching ability listed here should pay attention to the stages of young teachers' growth and the differences of disciplines in the specific implementation.

In order to play a guiding role and facilitate quantitative evaluation, the indicators are divided into guiding indicators and evaluation indicators.

Guiding indicators

(1) Teaching design ability
 1. Be able to determine the teaching objectives properly

   The goal should be clear and meet the requirements of the curriculum; The goal should be comprehensive, giving consideration to knowledge, ability and emotion, and giving consideration to achievement and development; The goal should be moderate, in line with the reality of the school, and pay attention to the requirements of stratification; The goal should be specific and show the observable learning effect of students.
 2. Be able to arrange the teaching content properly

   Highlight the characteristics, key points, difficulties and key points of the teaching content; To be able to properly handle the relationship between in class teaching content and out of class teaching content; Be able to deal with teaching materials according to students' learning situation; Be able to select teaching reference materials correctly.
 3. Be able to arrange teaching activities reasonably

   To achieve the teaching goal effectively; It can fully mobilize students' learning enthusiasm; It can be full of variety and flexibility.
 4. Be able to write teaching plans in a standardized way

   The teaching plan accords with the teaching practice and is practical; Can correctly express the teaching purpose and teaching process.

(2) Teaching organization and expression ability
 1. Be able to attract students' attention in the teaching process

   The lectures are in line with the characteristics of students and the actual situation of the prerequisite courses; Can create a good teaching situation.
 2. Keep the tense and orderly rhythm of classroom teaching

   Carry out the classroom behavior standard consistently; Have a certain ability of teaching adaptability; Be able to attend class on time.
 3. Be able to use standard teaching language

   Teaching with standard Putonghua; The volume, tone and speed of speech should be coordinated with the teaching environment and content; The language is accurate and concise, and body language should be used appropriately.

4. Be able to cooperate with blackboard writing reasonably

   The characters on the blackboard are neat, moderate in size and reasonable in layout; The content of writing on the blackboard is concise, which matches the teaching content.
5. Be able to use teaching methods properly

   Teaching methods should be conducive to achieving teaching objectives; It is conducive to imparting knowledge and cultivating ability; Be able to use multimedia (PPT) properly, with moderate font size, reasonable layout and appropriate tone; The pictures are clear; The video animation is vivid.
6. It can effectively stimulate students' interest in learning

   To infect students with full enthusiasm and rich feelings; Stimulate students' curiosity through interaction; Give students the necessary encouragement.

(3) Teaching research ability
1. Be able to analyze and evaluate teaching behavior correctly

   According to the teaching practice to evaluate their own teaching situation; Timely check their own teaching gains and losses.
2. Be able to conduct teaching test effectively

   Be able to design stage test papers reasonably; Improve the teaching according to the test results.
3. Teaching and research ability

   It can absorb the cutting-edge scientific research achievements in time; Be able to summarize the rules and let students master the frontier of discipline development; Be able to learn and apply the theories of pedagogy and psychology; Learn from the advanced experience of other teachers; Be able to conduct teaching research, write teaching papers, surveys and research reports.

   Evaluation index

(1) Teaching design ability.

   Check content: syllabus, teaching materials, lesson preparation Notes (teaching plan), courseware, teaching calendar

1. Clear guiding ideology, moderate and specific teaching objectives, and reasonable schedule of teaching calendar (20%)
2. Lesson preparation Notes (teaching plan) and courseware can highlight the key points, difficulties and key points of teaching content; The assignment arrangement is closely related to the teaching content in class and the quantity is reasonable; The selection of teaching reference materials is correct (40%)
3. The prepared cases, examples, classroom discussion questions and thinking questions are conducive to the realization of teaching objectives; It can arouse students' learning enthusiasm (40%)

(2) Teaching organization and expression ability

Inspection content: classroom lectures, student seminars

1. Teaching attitude: prepare lessons well and give lectures seriously; To be a teacher and energetic; The teaching stick and other instruments are in place, and the volume and other equipment are adjusted well (20%)
2. Teaching content: the basic concepts, principles and terms are explained accurately, linked with the prerequisite courses, and easy to understand; The key points are highlighted and the difficulties are analyzed in place; The content is well organized; The combination of theory and practice can be combined with the development of the discipline (20%)
3. Expression ability: Putonghua is more standard; Speak clearly; The volume, tone and speaking speed are appropriate; Clear thinking, fluent language, infectious; Accurate and concise language, appropriate use of body language; Blackboard writing has neat font, moderate size, reasonable layout and concise content (20%)
4. Teaching methods: teach students in accordance with their aptitude, the rhythm of the classroom is tense and orderly, have a certain ability to deal with emergencies, and be able to control the classroom; The classroom teaching is detailed and appropriate, highlighting the key points and difficulties, and combining with the teaching content to create a situation, the effect is obvious; The coordination of blackboard writing is moderate; Pay attention to heuristic, interactive and discussion teaching, and pay attention to students' feedback information; Pay attention to the teaching of knowledge and the cultivation of ability; Can use multimedia (PPT) properly, font size is moderate, layout is reasonable, tone is appropriate; The pictures are clear; The video animation is vivid (20%)
5. Teaching effect: Students' teaching order is good; Focus on learning and have a strong interest in learning; Students' enthusiasm was 3; Students have high recognition of teachers (20%)

(3) Teaching research ability

Inspection contents: Young Teachers' teaching experience, written summary, forum, test paper, teaching research paper

1. Self evaluation: self evaluation of teaching situation; Timely check the teaching gains and losses (30%)
2. Teaching test: reasonable design of students' stage test papers; Adjust the teaching strategies according to the test results (30%)
3. Teaching research: combining scientific research achievements in teaching; Learn from the advanced experience of other teachers; Write teaching papers, surveys and research reports (40%)

2 The Stander of Teaching Ability Evaluation

Based on teaching research projects, teachers' teaching reform should be promoted. We should strengthen the management of educational scientific research projects, and do a

good job in organizing the declaration, process management, and conclusion appraisal of various projects at the national, provincial, and school levels. Implement the "Teacher Excellence Project", encourage and support teachers to carry out theoretical and practical research around education and teaching, talent training, teacher development and other issues, and create a good atmosphere of paying attention to teaching and researching teaching.

To improve teaching ability as the goal, organize teacher training seminars. Organize the induction training for new teachers, and promote the new teachers to change their roles and adapt to the post needs as soon as possible through various forms of teaching training such as "micro teaching world" and "induction teaching world". Focusing on the cultivation of key teachers, we should organize and implement the "training plan for the best teaching key teachers" in a planned and step-by-step way, so as to create a backbone of teachers who play an exemplary role in the practice of education and teaching. For all teachers in the school, a series of training and promotion activities such as "excellent forum", "excellent exhibition forum", "teaching Salon" and "Teaching Workshop" are carried out to promote the renewal of teachers' teaching ideas and the improvement of teaching level.

In order to solve teaching problems, we should carry out teaching diagnosis consultation. According to the needs of teachers, we provide targeted cooperative research and consulting services to help summarize teaching experience and break through teaching bottlenecks. Organize the implementation of "potential teachers' teaching improvement plan", track and guide through classroom evaluation, teaching consultation, teaching investigation, etc., stimulate teachers' teaching potential, and constantly improve teachers' teaching ability. We should carry out consultation on teaching theory, teaching research, teaching methods, modern educational technology and teachers' professional development, so as to meet the needs of school characteristic talent training and teachers' personalized professional development.

With teaching demonstration as the starting point, build a teaching exchange platform. We should actively organize exchanges and cooperation between teachers at home and abroad to promote teaching experience sharing and teaching reform and innovation. Actively expand external contacts, participate in domestic and foreign teachers' teaching development conferences, learn advanced education and teaching concepts, and actively integrate into the process of modern education. We will further improve the "excellent teaching think tank" and give full play to the leading role of our excellent teachers in teaching. Use the network platform to gather high-quality courses inside and outside the school, and form the digital teaching resources co construction and sharing.

Focus on the implementation of teaching evaluation to provide teaching quality assurance. Speed up the construction of teaching quality assurance system, establish the basic status database of undergraduate teaching and professional teaching, organize and carry out teaching evaluation including professional evaluation, curriculum evaluation and practical teaching evaluation, and explore the promotion of social third-party evaluation and international evaluation. We should establish a database of teachers' teaching quality assessment and evaluation, strengthen the assessment, inspection and evaluation of teachers' moral cultivation, professional level, teaching ability and teaching effect,

attach great importance to students' teaching evaluation and result feedback, and ensure effective teaching reform and continuous improvement of teaching quality.

Based on the construction of teaching system, we should construct the excellent teaching culture. Establish and improve a series of policies, including project management, teacher training, teaching evaluation, resource construction, etc., to provide action guidance for teachers' teaching development. Improve the teaching incentive system, organize excellent teaching award selection, young teachers' teaching talks, micro class teaching competition and other activities to stimulate teachers' enthusiasm, initiative and creativity in teaching. To promote the advanced teaching culture, we should compile teaching cases, research results of teaching projects and teachers' works.

3   Big Data Analysis Model of English Teaching Ability Evaluation

3.1   Big Data Analysis of Constraint Parameters in English Teaching Ability Evaluation

In order to realize the accurate evaluation of English teaching ability, it is necessary to construct the information sampling model of English teaching ability. Combined with nonlinear information fusion method and time series analysis method, the statistical analysis of English teaching ability is carried out. The index parameter of English teaching ability constraint is a group of nonlinear time series. This paper constructs a high-dimensional feature distribution space to express the parameter index distribution model of English teaching ability evaluation [1]. The main index parameters of English teaching ability include the level of teachers, the investment of teaching facilities, the level of policy relevance, etc. An information flow model is constructed to express the constraint parameters of English teaching ability.

$$x_n = x(t_o + n\Delta t) = h[z(t_0 + n\Delta t)] + \varpi_m \tag{1}$$

The gray model is used to evaluate the level of English teaching ability quantitatively and recursively. Assuming that the historical data of the distribution of English teaching ability is expressed as, the probability density functional of the prediction estimation of English teaching ability is obtained when the initial value of the disturbance characteristic is fixed:

$$u_c(t) = Kx_c(t) \tag{2}$$

By using the method of surrogate data to randomize the amplitude of English teaching ability, we can get x (k). By using the perturbation functional to the empirical distribution data of class k, we can get the subclass set of class K. from this, we can get the utilization ratio of English teaching resources distribution, which can be expressed as follows:

$$U_{unitl} = \gamma \overline{X} \tag{3}$$

3.2   An Assessment Model of English Teaching Ability

Based on the analysis of the big data information model of English teaching ability evaluation by using the fixed recursive analysis method, in order to improve the evaluation ability of English teaching, this paper proposes an English teaching ability estimation method based on big data fuzzy k-means clustering and information fusion, The problem of English teaching ability evaluation is transformed into the problem of solving K-means clustering objective function as least square estimation. As shown in Fig. 1. The least square problem is to find the Consistency Estimation of resource constraints in English teaching ability assessment, which makes the remaining YX β B reach the most F-norm in the European norm, and obtains the feature extraction value of the feature information of English teaching ability constraint.
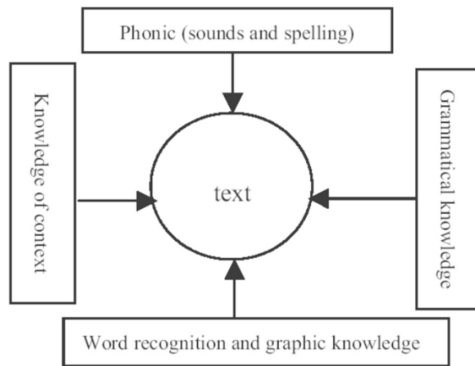

Fig. 1. Model of English teaching ability

4   The Significance of Multidimensional Interactive Teaching Mode in College English Teaching

4.1   Help to Enrich the Teaching Form

In the process of College English teaching, in order to avoid the problem of "indoctrination teaching", teachers blindly guide students to carry out autonomous learning. Although this teaching method can improve students' interest in learning for a period of time, in the long-term learning process, students will be unable to learn deeply because of the problem of learning ability, Eventually lead to serious polarization in the class [2]. Therefore, in the process of teaching, College English teachers need to change the concept of College English teaching, guide students through diversified teaching methods, and then improve students' English learning ability. Different from other teaching stages, College English teaching generally attaches importance to students' English application ability. In more cases, teachers should cultivate students' oral English ability, so as to improve students' ability to master the knowledge. Therefore, in the process of multidimensional interactive teaching, teachers can use the multi-dimensional interactive way

to organize some communication activities for students, and set aside a lot of time for students to practice English application ability, so as to enrich the teaching form in College English classroom.

4.2   The Concept of Curriculum Ideological and Political Education

Based on the concept of "curriculum thinking and politics", the paper aims to define the training objectives of talents in combination with the characteristics of English subjects and the rules of students' cognitive development. It involves the top-level design of curriculum standards, selection of teaching materials, deep exploration of teaching content, design of classroom teaching, teaching methods, teaching evaluation, and improvement of teachers' team curriculum awareness and ability, This paper studies the teaching practice of cultivating students' critical thinking and innovation ability, taking the advanced course of new generation English published by foreign language teaching and Research Press as an example. Money matter is the reading lesson of unit 4. The teaching content highlights the elements of Ideological and political education, and integrates the elements of Ideological and political education while learning language knowledge. With the help of online and offline blended teaching, through cooperative learning and autonomous learning, students can master the language knowledge points, understand the purpose of reasonably controlling their own money, clarify the overall framework and context, and learn to distinguish rational consumption, avoid money worship and hedonism, so as to help students form a correct outlook on life and values (Fig. 2).
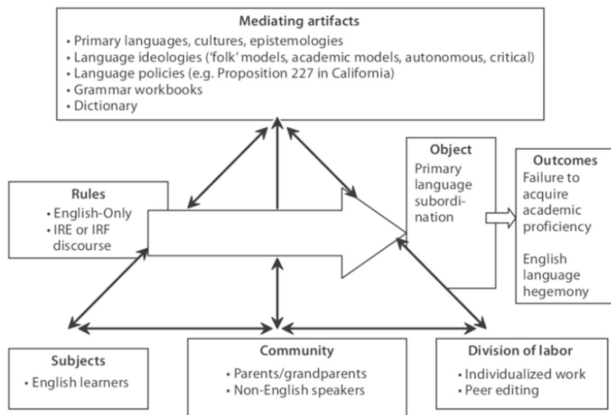

Fig. 2. Main introduction of the course idea

4.3   Help to Stimulate Students' Interest in Learning

Interest in learning is of great significance to students at each stage of learning, and stimulating students' interest in learning is also something that the education department has repeatedly put forward and explicitly requested. However, in the process of College

English teaching, students' interest in learning English course is very low. Many teachers only pay attention to whether students have mastered the knowledge, but ignore whether students can use the knowledge flexibly [3]. As a result, students' English application ability is very weak in the learning process, which makes students unable to raise their interest in learning English course. Therefore, in the process of teaching, teachers should organize corresponding teaching activities for students to stimulate students' interest in learning. At the same time, they should improve the interaction with students, and use effective multi-dimensional interaction to improve students' interest in learning. For example, organize English drama performance or English Movie Dubbing activities for students to ensure that students can master English application ability in the course learning process, so as to improve students' interest in learning, so that students can deeply understand the charm of English course, and improve students' Comprehensive English learning ability.

5   The Application of Multidimensional Interactive Teaching Mode in College English Teaching

5.1   Fully Respect the Subject Status of Students

In the current development process of the times, the society and enterprises have an increasing demand for diversified talents, and the demand for talents with strong English application ability is growing day by day. Therefore, in the current era, College English teachers begin to change their teaching methods in the process of teaching, through the multi-dimensional interactive teaching method to guide students, and show students' dominant position in the classroom. To ensure that students can learn and communicate according to their own understanding of the course in the process of learning, for example, when they encounter some articles with strong communication, teachers can give the classroom to students, and organize dialogue and exchange activities for students, so that students can speak freely in the activities, so that students feel the importance of teachers, and then enhance the dominant position of students in College English classroom.

5.2   Actively Carry Out Group Activities

In College English teaching, the communication between students is very scarce, but the communication between students is the best teaching method. Therefore, when teachers use multi-dimensional interaction to teach students, they should pay attention to this problem and set up learning groups for students, so as to improve students' communication ability and make students find common topics in the process of mutual communication, so as to solve the problem that students dare not speak English aloud. Therefore, teachers can set up some flexible classroom questions for students, or carry out classroom debate activities for students, so as to improve the cooperation ability of students' learning groups through these teaching guidance methods.

5.2.1 Make Clear the Goal of Talent Training

The traditional goal of talent training in Higher Vocational English teaching is to emphasize the training of knowledge and skills, but neglect the training of thinking ability. Proficient in foreign languages, with solid basic skills, master the skills of listening, speaking, reading, writing and translation. But it is easy to lead to the "island effect" that English curriculum and ideological and political education are isolated from each other. Therefore, we need to change our ideas. The direction of Higher Vocational English Curriculum Education Based on "curriculum ideological and political education" must be accurate, otherwise it will backfire. We should think about what kind of people to cultivate and how to cultivate them. We should take students as the center, guide students to transform the knowledge and skills they have learned into their inner morality and accomplishment while imparting knowledge and skills, continuously improve students' Ideological and political awareness, cultural cultivation and moral quality, and lead the ideological and political goal of the course with the combination of morality, intelligence, sports and beauty.

5.2.2 Enhance the Ideological and Political Awareness and Ability of Teachers

Teachers are the key to make good use of the main channel of classroom teaching, the implementer of curriculum education, and the basic requirement of being a teacher and learning high school as an educator. Xi Jinping's qualified teacher should first be a moral qualified person, and a good teacher should first be an example of Naruse Nori and Germany. Teachers are the mirror of students' moral cultivation. Teachers' awareness and ability of Ideological and political education are directly related to the effect of curriculum ideological and political education and the standards for good teachers in the new era are ideal and belief, moral sentiment, solid knowledge and benevolence [4]. The work of teaching and educating people includes not only spreading knowledge, truth, culture and thought, but also shaping peaceful personality and cultivating correct world outlook, outlook on life and values. Teachers identify with the ideological and political leaders of the curriculum, strive to improve the level and pattern of ideological awareness, adhere to socialist ideals and beliefs, and strengthen cultural confidence, so as to realize classroom learning.

5.3 Integrating and Optimizing Teaching Resources

In the process of teaching, College English teachers should pay more attention to the integration of teaching resources. Many college teachers often use the content of teaching materials to teach students, but the content of teaching materials is relatively limited. Therefore, if teachers want to reasonably carry out multi-dimensional interactive teaching, they should use modern teaching tools to teach students, such as using multimedia teaching equipment to play foreign film clips for students, so as to help students understand the western culture and the way of communication with westerners. At the same time, teachers can also guide students to communicate with movie clips, so that college English teaching content can be effectively expanded, and at the same time, students' English application ability can be improved, so as to promote the modernization of College English curriculum.

6   Conclusion

Through the above summary, we can see what problems exist in the teaching process of College English teachers, and also understand the help of multi-dimensional interactive teaching method for teachers and students. Therefore, in the process of teaching, College English teachers should make rational use of the multi-dimensional interactive teaching mode, so as to improve students' English application ability and further improve the comprehensive ability of students. Not only that, teachers should also carry out teaching activities for students in a reasonable way, so as to ensure that students can firmly grasp the knowledge of Chinese characters in teaching activities, Further improve students' English application ability. The application of multi-dimensional interactive teaching mode not only improves students' learning ability, but also helps teachers to make clear the direction of education development, so that teachers can constantly reflect in teaching practice, so as to effectively improve the quality of College English teaching.

References

1. Lu, J.: Analysis of College English reading ability evaluation model. J. Shanxi Young Manage. Cadre Coll. **22**(2), 105–107 (2009)
2. Zhang, M.F.: Principles and Methods of Intercultural Communicative Competence Assessment in College English Teaching. Hebei Normal University (2008)
3. Zhang, J.: The development trend of English learning strategy research. J. Northeast Agric. Univ. (Soc. Sci. Ed.) **2**, 71–73 (2007)
4. Xie, X.L.: Algorithm and implementation of College English teaching comprehensive ability evaluation system. J. Guilin Inst. Technol. **3**, 360–364 (2004)