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## Research on fuzzy theory based evaluation model of web-based university english learning

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### ABSTRACT

The web-based multimedia teaching has been employed especially in English class by most Chinese universities to share international educational resources, broaden students' horizon, and take them to experience lives abroad via the Internet; however, most of these universities employ the traditional way—taking exams—in exam-oriented education and fail to take effective evaluation method to check students' performance in English learning. This paper employs, based on the Fuzzy Comprehensive Evaluation (FCE) method and university students' psychological and learning characteristics, designs an evaluation index system of both quantitative and non-quantitative nature, establish a fuzzy theory based evaluation model of web-based university English learning, and researches the model with case study and computer simulation. According to the research, the fuzzy theory based evaluation model is practical, easy and feasible, can fully demonstrate students' English learning; hence, it can be promoted.

### KEYWORDS

Web-based english learning; Fuzzy theory (FT); Model design; Evaluation indicator.



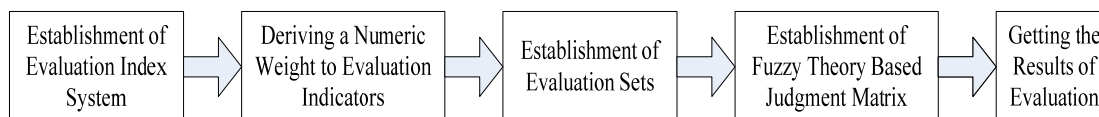
## INTRODUCTION

With the development of computer and Internet technology, the web-based learning has changed a lot. However, the supporting quality evaluation system does not make the same progress; web-based learning is lack of effective evaluation devices; and the evaluation of web-based learning is still in the starting stage.

Originating from the moment teaching starts, teaching evaluation, based on teaching aims, is to evaluate the process of teaching and learning and promote students' development with scientific methods. In different period and region, teaching evaluation takes different paths to develop.

Teaching evaluation has developed for a long time through dynasties in ancient Chinese. The earliest book about education and educational problems in both China and the world, is *The Note of Learning* in which details about the evaluation system in the Western Zhou dynasty (BC11<sup>th</sup> century—771 BC) including teaching evaluation system, is taken down; this is the earliest teaching evaluation thought. In the Han dynasty (BC 202-220), the major method of picking up filial people and appointing officials is the recommendatory system with clear requirement about what to evaluate and how to evaluate, which is the foundation of the imperial examination system in later period. At the end of the East Han dynasty (25-220), recommendatory system gradually stepped out of the historical stage due to fights among warlords and the upper class taking up the Imperial College in feudal China; and the nine-rank system, one of the three officials choosing systems in ancient China, started to took effect in history. In the Sui and Tang dynasties (581-907), Chinese history ushered in the age of the imperial examination system. The imperial examination system broke the hereditary system and started to choose officials from the people through examination; it extended the selection scope and provided opportunities to the lower class; the line "all things are nothing, compared with reading" reflects not only people's desire for knowledge but also the popularity of reading. The imperial examination system takes the form of examination which still exerts impact on though of Chinese people. As traditional way of evaluation, examination has some great disadvantages which are already out-dated. In this sense, it has been quite difficult to evaluate students' learning simply with written examinations. Then the developing teaching evaluation has replaced the traditional way of written examination for it can better promote students' development and, with multiple subjects, it is helpful to promote teaching quality. Nowadays, progressive teaching evaluation cares not only the teaching process but also information collection, analysis and judgment as well as ability promotion in the process; it speaks highly of teaching achievements, points out problems and shortcomings and helps adjust teachers' teaching methods and improve teaching quality.

With the promotion of education for all-round development, teaching evaluation becomes more necessary. This paper is to find out the teaching evaluation indicators through a research on evaluation of English class, analyze the advantages and disadvantages of progressive teaching evaluation and concludes effective ways to improve teaching evaluation system, thus promoting students' all-around ability and their competitiveness. The fuzzy comprehensive evaluation process is shown as Figure 1.



**Figure 1 : Fuzzy comprehensive evaluation process**

This paper is to talk about the history of teaching evaluation and lists the key indicators in teaching evaluation. It is to choose two English major classes, one control class and the other experiment class, to discuss the progressive teaching evaluation in English classroom. By comparing the progressive teaching evaluation to the traditional summative one, the paper is to analyze the good and bad about progressive teaching evaluation, put forward effective ways to improve teaching evaluation system, and design a proper fuzzy theory based evaluation model of web-based university English learning.

### ESTABLISHMENT OF EVALUATION INDEX SYSTEM FOR WEB-BASED UNIVERSITY ENGLISH LEARNING

What need to be made sure should be the evaluative dimensions. By referring to Henri's intermodal model and concluding all the evaluation index systems at home and abroad, the paper is to assess teaching taking into consideration the current web-based university English learning and the features of web-based university English learning. The evaluative dimensions include quality teaching, market competitiveness and teaching brand. From what have been discussed above, it can be concluded that the key indicators affecting teaching evaluation are as follows.

Firstly, in the present colleges and universities, teachers pay more attention to the combination of their teaching and researching abilities; they are not required to graduate from a normal university or college, or have received complete and systematic teaching training; although they teach they prepare for their classes before class, teach knowledge in a logic way during class, and evaluate teaching with after-class homework or drills. All of these actually require teachers to conclude and explore with long time and much practice, so the present situation of college teachers is to affect teaching in a negative way.

Secondly, teaching evaluation can not be finished by a single examination but through assessments by experts, colleagues and students. The experts and colleagues' evaluations are just some comments on a teaching segment, which is full of uncertainty and is tempted to exert negative impact.

Moreover, English in colleges and universities differs from other majors' classes in difficulty; therefore, the difficulty of college English can be an indicator affecting the class. And the other factors needs to be considered in the teaching evaluation includes how many classes the teacher teaches and how many students the teacher teaches for the mean value of students' evaluation would affect the result too. It is difficult to evaluate fully the teaching quality with traditional way of taking examinations. Therefore, transition from the traditional teaching evaluation to progressive teaching evaluation can better promote students' development; and multiple subjects are helpful to improve teaching quality.

Fourthly, there is not a single standard for teaching evaluation so that, the result of teaching evaluation varies from person to person and is based on each individual's understanding of evaluation indicators. When the evaluation is carried, there is no communication between the evaluator and evaluatee; in this way, the one who is evaluated has no idea about the evaluation result, can not defend himself or herself, thus leading to false evaluation.

Lastly, the present teaching evaluation is mainly used for rewarding or punishing someone and the evaluation result would be listed from top to down. However, the one who is evaluated has no idea about why the evaluation goes like this, let alone making improvements. Therefore, the inefficiency of feedback mechanism is one indicator affecting teaching evaluation. The evaluation index system for web-based university English learning is shown as TABLE 1.

**TABLE 1 : Evaluation index system for web-based university english learning**

Indicators on the First Level U <sub>i</sub>	Indicators on the Second Level U <sub>ij</sub>	Evaluation Indicators
Learning Attitude	1. Finish the Learning Based on Teaching Plan	Surf the Internet; Learn from PPT and Other Related Materials; Finish Homework; etc.
	2. Take Part in On-line Teaching Activities by Teachers	Ask and Answer Questions; Watch Videos; Listen to Audios; Answer Others' Questions; Take Tests; etc
	3. Tend to Communicate with Partners	Ask and Answer Questions; Communicate Simultaneously or Otherwise; Sent E-mails; Post Information on BBS; etc.
	4. Be Able to Accomplish Some Challenging Problems	Put forward Teaching Plan; Hand in Works; Learn Comments for Students from Teachers; Share Useful Learning Materials; etc.
	5. Be Able to Behave, and Learn by, Himself or Herself	Review by Reading Notes; Use Learning Software; Learn Marks and Other Notes; Collect and Organize Learning Web site; Save Information Sources; Reflection and Conclusion Based on Learning
	6. Be Able to Take Notes and Review What Have Been Learnt	Take Down E-Notes and Classroom Activities
	7. Take Part in Face-to-Face Teaching Activities by Teachers	Frequency and Length of Time on Face-to-Face Teaching Activities by Teachers
	8. Be Able to Finish Assigned Homework Timely	Hand In Homework; Check the Score of Homework
	9. Do Not Cheat in Homework, Tests and Examinations	Grades; Number of Published Papers
Interaction	1. Often Answer Teachers' Question	Answer Questions; Times of Asking Questions; Answer Others' Questions;
	2. Often Post Program-related Opinion	Answer Questions; Number of Published Papers
	3. Be Able to Conclude Valuable Things from Others' Opinions and Express it in His or Her Own Language	Published Papers; Post Information on BBS; Comments between Teachers and Students
	4. Communicate a Lot with Teachers and Other Students	Interaction in Chatroom
	5. Give Constructive Advice on Teaching	Times of Give Constructive Advice on Teaching
	6. Answer Timely the Questions by Teachers	Time and the Times of Answer Questions by Teachers
	7. Cooperate with Other Students and Finish Assigned Homework	Times of Take Part in Discussion; Put Forward Solutions

**FUZZY COMPREHENSIVE EVALUATION MODEL FOR WEB-BASED UNIVERSITY ENGLISH LEARNING**

It is ruled that the indicator sets is  $U$ , then in the equation  $U = (u_1, u_2, \dots, u_n)$ ,  $U_i$  refers to each of the indicator.

(1) It is ruled that the indicator sets on the first level go like this:  $U = (u_1, u_2, u_3, u_4) = (\text{Making Use of Learning Material, Learning Attitude; Communication and Cooperation; Grades})$ ; the its weight sets are  $A = (a_1, a_2, a_3, a_4)$ ;  $a_i$  ( $i = 1, 2, 3, 4$ ) refers to the weight of  $U_i$  in students' total grade  $U$ ; also,  $\sum a_i = 1$ .

(2) It is ruled that the indicator sets on the second level go like this:  $U_i = (u_{i1}, u_{i2}, \dots) = (\text{Finish the Learning Based on Teaching Plan; Take Part in On-line Teaching Activities by Teachers; ...})$ ; the its weight sets are  $a_i = (a_{i1}, a_{i2}, \dots)$ ;  $a_{ij}$  ( $i = 1, 2, 3, 4$ ) refers to the weight of  $u_{ij}$  in students' total grade  $u_i$ .

(3) It is ruled that fuzzy evaluation sets go like this:  $V = (v_1, v_2, v_3, v_4, v_5)$ ; and every parameter in the sets is derived with a numeric value.

From the result of an academic year, students in the two classes do not embrace a solid foundation and are lack of initiative and interest in English learning. Therefore, although they can get a fair grades in examination, their grades in the parts of listening and speaking are pretty lower than that in writing. The five levels here in the evaluation system are A+, A, B+, B, C. The Five Levels in the Evaluation System is shown as TABLE 2.

**TABLE 2 : Five levels in the evaluation system**

Grades Scope	Comments	Level	Variables
$90 \leq x < 100$	Excellent	A+	L1
$80 \leq x < 90$	Good	A	L2
$70 \leq x < 80$	Fair	B+	L3
$60 \leq x < 70$	More work needed	B	L4
$X < 60$	Not Satisfied	C	L5

As what have been discussed above, an-academic-year long research is made, in respect to adding progressive teaching evaluation in class one rather than class two. Some conclusions have been made. Through training, students in class one make progress in all the four parts—listening, speaking, reading and writing; they become interested and active in English learning; they are not afraid of making mistakes anymore but are confident enough to speak and write. Conversely, students in class two make little progress in listening and speaking parts; they still write in the same way they did. However, in the writing, students in two classes do not differ much. Therefore, the overall ability English of students in class two is lower that that in class one, which indicate that the evaluation index system is true and reliable.

**CASE STUDY OF THE FUZZY COMPREHENSIVE EVALUATION MODEL**

Based on these experiments, it can be seen that progressive teaching evaluation has the irreplaceable advantages. On one hand, comparing the results of the two classes, it can be seen that the English curriculum under progressive teaching evaluation pays more attention to the overall progress of students, making the progressive evaluation more comprehensive than the final assessment. Its evaluation standard is based on students' performance in different periods and different study contents, which promotes the all-round development of students and improves their initiative and enthusiasm in study, making the evaluation results more convincing.

$$B^{(1)} = \begin{pmatrix} 1 & 2 & 1/3 & 1/7 \\ 1/2 & 1 & 1/5 & 1/8 \\ 3 & 5 & 1 & 1/5 \\ 7 & 8 & 5 & 1 \end{pmatrix} \tag{1}$$

On the other hand, the progressive teaching evaluation is not the once for all evaluation at the end of a semester, but integrates into the progress of daily teaching, in which teaching problems can be easily found, and the teacher can timely adjust teaching methods and correct the problems that students meet in study, making the established teaching objectives more achievable. Thirdly, the traditional evaluation only reflects students' performance in study. However, the progressive evaluation includes self-evaluation of students. It enables students to achieve self-assessment from various aspects: the self, classmates and teachers, making it more convenient both for students and teachers to get a thorough look from various aspects in study, and that is why the progressive evaluation is more convening in the assessment of teaching. Finally, the progressive evaluation always runs through teaching process. It is an effective combination of teaching and evaluation. The evaluation process is also a process for improvement both for teaching and study.

Hence how to master the evaluation strength has become an important question. In addition, we found that although all the class has used the progressive evaluation, because of different study methods, different understanding about English

and huge difference in English level of every student, there still is a debate among justice in English teaching, thus how to embody justice and equity has also been a remarkable problem. It is a contradiction in just one class, but if we spread the evaluation method into more individuals, with more students participating in the evaluation, it is open to question whether all students will accept it. The definition of Value Scale is shown as TABLE 3.

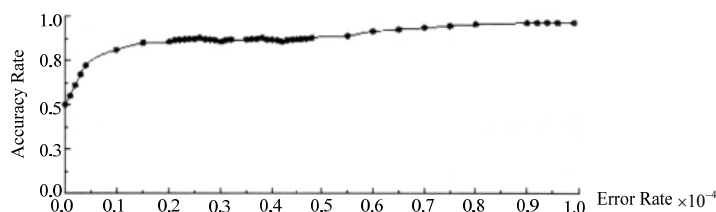
**TABLE 4 : Definition of value scale**

Scale $\alpha_{ij}$	Definition
1	Indicator i is equally important with j
3	Indicator i is a little more important with j
5	Indicator i is more important with j
7	Indicator i is much more important with j
9	Indicator i is way more important with j
2, 4, 6, 8	somewhere between the definitions above

### CONCLUSION ON THE FUZZY COMPREHENSIVE EVALUATION MODEL

This paper, based on a research of 90 subjects who are from two different classes, analyzes the accuracy and robustness of the fuzzy theory based evaluation model and concludes that the function of progressive evaluation method can not be exaggerated despite of all its the advantages. Progressive evaluation method is no way omnipotent and can not solve all problems in the process of teaching. In the teaching, the teachers should see both the good and the bad of the method, make most of the good and get rid of the bad, thus making most of it.

Moreover, just as what have been discussed above, every individual is different. Some students may make greater progress than the other ones in the class evaluated with progressive evaluation method, which is normal and absolutely with question. The teachers should not regard this as a problem in teaching, but they can help students learn in different ways, make them more confident and their targets more clear, and eventually achieve the teaching objectives. The curve of accurate-error rate is demonstrated in Figure 1.



**Figure 1 : Accurate-error rate of web-based university english learning**

This result indicates that that the evaluation index system is well structured and the fuzzy theory based evaluation model is quite practical and can help to make results more scientific and full reflect students' study.

The widely used teaching evaluation method is summative assessment; however, the method focuses on the final grades rather than the all-around competence of students and fails to reveal the good aspects, problems, shortcomings as well as students' progress in teaching. On the contrary, the progressive evaluation method covers the whole process of teaching and can make assessment from different perspective and degree; also, it can reflect problems and shortcomings in teaching so that teachers can make improvements; therefore, the method can improve teachers' teaching and students' learning. In this sense, the latter method is better for all-around progress in English learning; and it is encouraged to adopt the method and solve problems in evaluating web-based university English learning in China.

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