An Empirical Study and Analysis of the Construction of Foreign Language Learning Performance Model

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Abstract

In the current Internet age, the new learning environment puts forward higher requirements for students' learning ability. In order to enable students to fully adapt to the new learning environment and various advanced web-based platforms, based on the foreign language learning performance model, the author conducts a comprehensive analysis and empirical study. Firstly, the author introduces the related theory and introduces the specific research methods in detail, and then on the basis of the results of empirical study and constructs the assessment model of foreign language learning performance, in order to determine more accurately the learning status of students, help teachers to further adjust and optimize the teaching plan, help students to develop more scientific and effective learning objectives and strategies, effectively improve the learning efficiency of students and enhance their ability of comprehensive application of foreign languages and lay a good foundation for future sustainable development.

Keywords: Foreign Language Learning, Performance Model, Empirical Study, Assessment and Analysis.

1. BACKGROUND

1.1 Literature review

In recent years, the Ministry of Education actively improves and vigorously promotes the new teaching model of college English based on Internet and multimedia. Besides, various institutions of higher learning has invested heavily in teaching hardware and software. Currently, the foreign language teaching environment and practice based on Internet and multimedia in institutions of higher learning have basically taken shape (Wu and Tian, 2011). However, in the era of information economy, we certainly will pay more attention to how much social and economic benefit can be given to educators and learners with such a huge amount of national manpower and financial input, namely, what is the performance of foreign language learning? What are the changes in the connotation of foreign language learning performance in the new environment? Therefore, the study on foreign language learning performance model in the Internet and multimedia environment has become one of the most important topics. The study on foreign language learning performance in the Internet and multimedia environment in China start relatively late. It is at a small scale and there are many problems, which are mainly embodied in two points. Firstly, the definition of foreign language learning performance is not scientific. Due to the long-term influence of examination-oriented education, foreign language learning performance in many studies is still equivalent to the "exam result", the assessment criterion are too simplified, attention paid to the process factors of learners' such as used of strategies and communicative competence performance in the Internet and multimedia environment is far from enough, which are not included in the research of foreign language learning performance. When reflecting to the teaching practice, it leads to lack of learners' learning motivation, rigid learning mode and valuing examination results over application, which is obviously contrary to the original intention of quality-oriented education in college foreign language teaching reform. The reason is the negative backwash effect of unscientific foreign language learning performance view (Lei and Shu, 2011). Secondly, the research methods of foreign language learning performance are to be improved.

1.2 Research objectives

At present, most of the existing literatures are based on speculative research, and there are few empirical studies. However, the establishment of various factors of foreign language learning performance model and the construction of assessment mode obviously need data support under the guidance of system theory, which is not convincing only by speculative research (Li, 2013). Therefore, in this study, the author intends to take empirical study as the main research method and tries to build a foreign language learning performance model based on the
Internet and multimedia under the guidance of foreign language teaching theory and linguistic theory and combining the practice of college foreign language teaching in China.

2. THEORETICAL FRAMEWORK OF LEARNING PERFORMANCE

2.1 Constructivism theory

This theory will guide the study from the aspects of the learning subject, the environment and even the assessment of learning performance. The main points are as follows: Cognition is formed in the interaction of the cognitive subject (learner) and the objective environment (social and cultural situation and natural environment); the development of cognition is acquired by the learners in the continuous meaning construction of the cognitive structure. The development of construction process is spiral. This theory requires language learners not only to learn, but also to do well in learning, not only to learn knowledge, but also to learn and apply. Students are active constructors of knowledge and meaning. The knowledge provided by textbooks should be the object for students to construct their meanings. The role of the Internet and multimedia is to create situations, and the process of student knowledge construction should be emphasized when evaluating (Zhao, 2013). Figure 1 below is a teaching model under the theory of constructivism.

![Figure 1. Constructivist Teaching Model](image1)

2.2 Metacognitive strategy theory

Metacognitive strategy is a strategy of senior management and a strategy for learners to plan, implement, rethink, evaluate and adjust learning, which includes: (1) Planning strategy: to determine the learning goals, predict the key points and difficult points, analyze how to accomplish the task and arrange the learning time. (2) Monitoring strategy: to monitor whether you have mastered the content of learning, whether you are attentive, whether your learning strategy is appropriate, and whether you have implemented independent learning and training according
to plan. (3) Assessment strategy: to assess the difficulty of learning materials, the implementation of the learning program, the progress made in learning and the existing problems (Lai, 2013). In the environment of media and the Internet, metacognitive strategy can guide students to choose learning strategies and resources, control their learning process, assess learning performance, and create learners of truly independent learning and lifelong learning. Figure 2 shows a teaching process of metacognitive strategy theory.

2.3 Theory of autonomous learning

Autonomous learning ability refers to the ability of learners to be responsible for their learning in the process of learning. In this study, it is an important parameter to measure the learning ability of foreign language learners. The ability of autonomous learning is embodied in several aspects: (1) The learner's learning is entirely dependent on himself; (2) A set of skills that can be learned or used in the process of autonomous learning; (3) The responsibility of the learner to his own learning; (4) The power of the learner to determine his own learning goals (Jia and Xu, 2013). Autonomous learning ability is the most important ability of English learners in the Internet and multimedia environment. Figure 3 shows the specific activities of teachers and students of autonomous learning theory.

![Figure 3. The Theoretical Structure of Autonomous Learning](image)

2.4 Definition of foreign language learning performance

Take the above theory as the framework, combine the characteristics of foreign language learning in the Internet and multimedia environment and refer to the learning performance functions proposed by Einhorn, Hogarth and Libby:

\[ P = K \times (M \times A \times E) \]  

Where P represents performance, K represents knowledge, M represents learning motivation, A represents learner's ability, and E represents learning environment. This study suggests that foreign language learning performance should be reflected in the ability of learners' acquisition of foreign language knowledge and skills and the use of them in specific learning environment, the definition of which tries to emphasize the process characteristics of foreign language learning performance: it not only refers to the mastery and reserve of foreign language knowledge, but also includes the ability to use the language flexibly, social communication ability and the ability to use the environment to learn.

3. RESEARCH METHODS

3.1 Design of preliminary questionnaire

In view of the foreign language learning performance is a dynamic and comprehensive system, which involves a series of processes, from planning to monitoring to assessment, the author selects 6 groups of person as providers of college students' foreign language learning performance preliminary questionnaire items, hoping to be able to fully reflect the performance of foreign language learning at different levels, they are sophomores, juniors and seniors, graduates who newly get jobs, person in charge of HR department of the employer, college English
teachers and English teaching researchers and so on, totaling 30 (Xie, 2014). Based on the theoretical framework of the study, the author designs interviews and open questionnaires, and asks them to provide 5 items related to the performance of foreign language learning in the Internet and multimedia environment and 147 items are collected from the original entries. After analyzing the original entries, giving a comprehensive consideration of the repeatability of contents, the text expression, the actual situation of the college foreign language teaching and so on, the author consolidates the items and compiles a preliminary questionnaire that includes 33 items (Liu, 2016; Wei and Cheng, 2015). The questionnaire asked the respondents to fill in the degree of consent to these questions on the Liken five-point scale, and all the items are in forward scoring.

3.2 Forecast and prepare the formal questionnaire

The small range of prediction is carried out among a total of 55 students including sophomores, juniors and seniors in an engineering college, and 49 valid questionnaires are collected. The author analyzes the data, determines the identification of the questionnaire items and deletes the inappropriate items. Firstly, the 25% of highest scores are identified as the high score group, 25% of lowest scores are identified as the low score group. SPSS13.0 is used to conduct independent sample t-test for two groups of data. Part of the data results are shown in Table 1 below.

<table>
<thead>
<tr>
<th>Table 1 Independent Sample Test for Prediction Questionnaire</th>
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Through the investigation of the significant probability (sig. value) tested by Leven, judge the homogeneity of variance and them determine significant probability, two-tailed t-test, if significant probability is less than 0.5, the item has the degree of discrimination; or for the trust interval of a discriminant value of 95%, if the trust interval does not include 0, then the difference between the two is significant (Liu, 2016). According to the results of the item analysis obtained by the criteria, the author deletes 12 unsuitable items and finally keeps 21 items to form a formal questionnaire. Then the reliability of the formal questionnaire is measured. The Cronbach's coefficient is used as a tool to test the reliability of the questionnaire. The higher the α coefficient, the more internal consistency and the higher the reliability of the factor.

3.3 Acquisition of questionnaire data

The author conducts a formal investigation into a wide range of 4 universities in different regions of the province and the respondents are sophomores, juniors and seniors. A total of 400 questionnaires - 100 questionnaires of each university / college are directly issued and 387 are collected, of which 334 are valid after the analysis process. The author conducts an exploratory factor analysis on the questionnaire, and the statistical analysis tool is SPSS13.0.

4. DATA STATISTICAL RESULTS AND DISCUSSION

4.1 Statistical results

Before exploratory factor analysis, the author carries out KMO measure and Bartlett's test to analyze whether the statistical data fit for factor analysis. After analysis, the value of the KMO measure is 0.882, indicating that the sample size meets the requirements and the data is suitable for factor analysis (Zhang and Hu, 2016). The statistics of Bartlett's test is 2535.663, p=0.000<0.05, indicating that the correlation coefficient matrix of the data is not a unit matrix, and the applicability of the factor analysis is affirmed. In the factor analysis, according to the factor
characteristic value greater than 1, conforming with screen test and the extracted factor can account for at least 3% of the variation factor before rotating, we screen the criteria and after several exploratory factor analysis and get the 4 factors of the performance of college students in College English learning. The eigenvalues of the 4 factors are all within the acceptable value range of greater than 1.0, and the variance of the 4 factors cumulative interpretation reaches 67%, which explains the variance of the whole scale. The load of each factor is between 0.522 and 0.816, which is higher than the acceptable value of 0.30 (Wang, 2016). Therefore, it can be concluded that the foreign language learning performance scale has a good structural validity. At the same time, from Table 4, we can also know that the Cronbach's Alpha coefficient of each factor is more than 0.7, the reliability coefficient of the whole questionnaire is 0.855, so the reliability of the questionnaire is rather good.

4.2 Analysis and discussion

In this study, using exploratory factor analysis, the author attempts to construct a four factor model of college students' foreign language learning performance, and the four factors are the mastery of language knowledge, changes of learning motivation, application ability of language knowledge and adaptability to learning environment (Xu, 2016). This model changes the traditional idea that foreign language learning performance is equivalent to static language test scores, and introduces learning motivation, ability and environment into the assessment of foreign language learning performance, reflecting the multidimensional characteristics of foreign language learning performance. At the same time, in this study, the author also analyzes the experimental data and describes the status quo of college students' foreign language learning performance.

5. FRAMEWORK OF FOREIGN LANGUAGE LEARNING PERFORMANCE FUZZY SYNTHETIC ASSESSMENT MODEL

5.1 Adaptive learning model of foreign language

Web-based adaptive learning process is a complex coupling operation based control system movement process, which requires web-based adaptive learners can actively eliminate interference factors other than learning on the learning process and set up their own learning performance assessment mechanism meeting their own learning characteristics and needs (Han and Jiang, 2014). In the web-based learning process, they should continue to compare with the learning goals preset in various stages of learning and make adaptive adjustment and improvement of learning strategies and methods of web-based adaptive learning according to the degree of deviation and learning performance in order to achieve the learning objectives initially set (as shown in Figure 4). To establish and improve the effective performance assessment of web-based adaptive learning mode from the microscopic point of view will be very helpful to the objective assessment of web-based learning process performance and helps learners adjust web-based adaptive learning goals and strategies to improve students' learning efficiency.

![Web-based Adaptive Learning Model](image)

**Figure 4.** Web-based Adaptive Learning Model

5.2 Specific implementation of assessment
5.2.1 Establish the corresponding membership function

Establish a clear assessment model, resulting in the corresponding path function \( u_i(u)=1, 2, 3, \ldots, 8 \), \( u \) belongs to \( A_i \) membership, and \( \mu_i(u) \) depends on the characteristics of \( u_1, u_2, \ldots, u_8 \). A1: Web-based learning time of the subject weekly; A2: Whether there is a planned strategy for web-based learning; A3: Whether the subject has a planned participation in the web-based interaction; A4: Whether the subject has an effective self-monitoring strategy; A5: Whether the subject has a very detailed and enforceable multiple self-assessment strategy; A6: The degree of response of the subject to the feedback of the assessment information; A7: Whether the subject is beneficial to the remedy of the target deviation; A8: Overall situation of web-based adaptive learning.

Assuming that \( X \) represents the set of performance assessment of web-based adaptive learning, the corresponding membership function is established for the current learning performance \( x \in X \), which needs to be evaluated.

Taking the weekly learning time of A1 main body for example:

\[
\mu_{A1}(x) = \begin{cases} 
0, & x_1 \geq 14 \\
\frac{14-x_1}{14}, & 7 \leq x_1 \leq 14 \\
1, & x_1 \leq 7 
\end{cases}
\]  

(2)

\( x_1 \) specifically reflects the time of online learning of the web-based adaptive learners in a general sense; according to statistics, if the weekly time of online learning of web-based adaptive learners is more than 14 hours, it can be considered that the web-based adaptive learners' weekly online self-learning time can basically ensure the time requirements for learning, then the membership function \( \mu_i(u) \) value of the weekly online learning time of the corresponding subjective is 0 (Xie, 2014). If the weekly time of online learning of web-based adaptive learners is less than 7 hours, it can be considered that the web-based adaptive learners' weekly online self-learning time can not meet the basic requirements, then the membership function \( \mu_i(u) \) value of the weekly online learning time of the corresponding subjective is 1. If the web-based adaptive learning time is between 7-14 hours per week, then the \( \mu_i(u) \) value of the membership function corresponding to different learning time can be calculated according to the above formula. Similarly, the membership function between A2 and A8 can be established, which are as follows:

\[
\mu_{A2}(x) = \begin{cases} 
\frac{x_2-3}{4}, & 3 \leq x_2 \leq 7, \\
0, & x_2 \leq 3 \\
1, & x_2 \geq 7 
\end{cases}, \quad \mu_{A3}(x) = \begin{cases} 
0, & x_3 = 3 \\
\frac{x_3-3}{4}, & 2 \leq x_3 \leq 4 \\
1, & x_3 \geq 7 
\end{cases}, \quad \mu_{A4}(x) = \begin{cases} 
0, & x_4 = 3 \\
\frac{x_4-3}{4}, & 3 \leq x_4 \leq 6 \\
1, & x_4 \geq 7 
\end{cases}, \quad \mu_{A5}(x) = \begin{cases} 
0, & x_5 = 3 \\
\frac{x_5-3}{4}, & 3 \leq x_5 \leq 6 \\
1, & x_5 \geq 7 
\end{cases}, \quad \mu_{A6}(x) = \begin{cases} 
0, & x_6 = 3 \\
\frac{x_6-3}{4}, & 3 \leq x_6 \leq 6 \\
1, & x_6 \geq 7 
\end{cases}, \quad \mu_{A7}(x) = \begin{cases} 
0, & x_7 = 3 \\
\frac{x_7-3}{4}, & 3 \leq x_7 \leq 6 \\
1, & x_7 \geq 7 
\end{cases}, \quad \mu_{A8}(x) = \begin{cases} 
0, & x_8 = 3 \\
\frac{x_8-3}{4}, & 3 \leq x_8 \leq 6 \\
1, & x_8 \geq 7 
\end{cases}
\]

5.2.2 Web-based adaptive learning assessment rules

According to the statistics principle, the pattern identification of \( u \) can use the combination of horizontal principle and maximum principle. When \( a \in A \), identification is refused. When \( a \notin A \), it can be identified according to the maximum principle. (1) The Level principle: Let \( A \subseteq [0, 1] \), so that \( a^{\text{mid}}=[\mu_1(u), \mu_2(u), \ldots, \mu_8(u)] \), if \( a \notin A \), identification is refused directly, and another analysis will be given, if \( a \in A \), then an identification is given, if \( \mu_1(u), \mu_2(u), \ldots, \mu_8(u) \in A \), then \( u \) belongs to \( A_1 \cup A_2 \cup A_3 \cup A_4 \ldots \cup A_8 \). (2) The maximum principle: If \( j \in (1, 2, 3, \ldots, 8) \), resulting in \( \mu_j(u)=\max\{\mu_1(u), \mu_2(u), \ldots, \mu_8(u)\} \), then \( u \) is relatively affirmative to \( A \), thus judging \( u \) belong to the type represented by \( A_j \) (Li and Liang, 2017). Introduce weight \( a_j, j=1, 2, 3, \ldots, 8 \) in the identification judgment of web-based adaptive learning performance assessment, and define the weight satisfying \( \sum_{j=1}^{8} a_j = 1, p(x)=(x_1, x_2, x_3, \ldots, x_8) \), representing the model of web-based adaptive learning performance assessment, let the fuzzy set \( E = A_1 \oplus A_2 \oplus A_3 \oplus A_4 \oplus A_5 \oplus A_6 \oplus A_7 \oplus A_8 \) representing the effect of adaptive learning performance
assessments. Define:

$$\mu_r(x) = \left\{ \begin{array}{ll} 1, & \max\{\mu_{A_2}(x), \mu_{A_5}(x), \mu_{A_6}(x)\} = 1 \\ \sum_{i=1}^{n} a_i \mu_{A_i}(x) & \end{array} \right. \quad (3)$$

where $a_1=0.1$, $a_2=0.1$, $a_5=0.1$, $a_8=0.1$, $a_6=0.1$, $a_7=0.1$, $a_8=0.1$ is taken according to historical data, theoretical data and empirical data.

6. CONCLUSIONS

At present, college students' foreign language learning still has the situation of "valuing knowledge over skills". Learners' learning motivation is still dominated by instrumental motivation, and the use of Internet and multimedia resources is still at a spontaneous stage. Of course, there are still many defects in this study. For example, the sample size is relatively small, and the data reflected may not be very comprehensive. However, the author hopes to attract more attention and call for deeper and more valuable research on the performance of foreign language learning.

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