Factors that Influence College-Level English Language Learning: A Structural Equation Perspective

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Abstract. The development of Internet technology has made it difficult for the traditional English teaching model of college students to meet the latest requirements. It is therefore necessary to explore the factors that influence college student English learning and to provide scientific support that will promote efficient English teaching. This paper collects data related to five aspects of the English learning situation of college students, specifically learning attitude, environment, input, motivation and status. It then constructs a structural equation model of college student English learning behavior. It distributes questionnaires to freshmen and sophomores at Hohai University’s Changzhou Campus and draws on data obtained from 326 questionnaires (386 were distributed). It combines the model's path system and constructs eight hypotheses (H1-H8) that are found to significantly influence the five aspects. The results show that learning attitude and input exert significant positive effects on learning. The paper concludes that educators who teach English to college students should focus on active learning, as this will drive improvements in the effect of English teaching.

Introduction

Rapid developments in Internet technology and the increased frequency of international cooperation and exchange have made it difficult for the traditional knowledge-centered teaching model to adapt to new requirements and challenges. It is urgent to adjust and optimize existing methods and models of English teaching that are applied to college students, and to explore how different factors affect college student English learning. This paper refers to theories of pedagogy, psychology and statistics, and also consults foreign research on this subject. It constructs the scale of college student English learning behavior, and designs a questionnaire that measures the learning behavior of students enrolled on Hohai University’s Changzhou Campus. The questionnaire is optimized through a practical survey, and the reliability and validity of the collected data are tested. The Structural Equation Model is applied to college student English learning behavior. The survey data is based on college students from Changzhou Campus, and it is used to analyse the key factors that affect the status quo of college student English learning. This tests the hypothesis and identifies ways of influencing college-level English learning. The research results will assist effective English language learning, provide a teaching reference and contribute to the reform of the current English teaching system.

Literature Review

Research into Chinese Students’ English Learning Behavior: A Summary

Previous studies demonstrate that self-confidence is a source of intrinsic motivation for learning, and highlight a close relationship between classroom anxiety and foreign language learning performance—by implication, serious learning anxiety will produce poor learning results. The study of learning behavior will provide insight into the factors that affect self-confidence and classroom.
anxiety. Scholars have therefore extensively studied English learning behavior. Gao and Liu\cite{1} discuss the need to study students' learning behavior in the era of big data, and also address the feasibility of this aim. They construct a large amount of data and apply ideas drawn from aspects of teacher evaluation and guidance, and also provide a point of scientific reference for teacher training. Wang et al\cite{2} develop a rational behavior analysis of the behavior of online learners in China, and assess the rational behavior of learners by collecting behavioral data that includes the Chinese online learner selection course. The learners mainly divide into rational and irrational herd learning behavior. When the course is more difficult, they demonstrate a stronger herd learning rationality; when they are more experienced, they are more rational. These results can be extrapolated to the learning behavior of online learners.

**Application Research of Structural Equation Models: A Summary**

The Structural Equation Model (SEM) is a statistical method that uses a linear equation system to express the relationship between latent and observed variables, and which is used to measure highly abstract and difficult variables. In recent years, it has been widely applied in Management, Psychology, Sociology and other fields. Luo et al\cite{3} combine theories of planned behavior, risk and technological acceptance and apply the Structural Equation Model with the aim of studying the public acceptance of reclaimed water reuse and exploring attitudes (on perceived behavior control, public acceptance, reclaimed water reuse, risk perception and subjective norms) and exploring their mutual relationship. Qiao et al\cite{4} seek to achieve compensation for land expropriation in the process of urban and industrial development in China by undertaking a questionnaire design and field survey and using the Structural Equation Model to study the factors that influence farmer satisfaction with land expropriation compensation.

**Conceptual Model and Research Hypothesis**

The scale divides learning behavior into five dimensions, specifically learning attitude, environment, input, motivation and status with the aim of understanding the interaction between them.

(1) **Learning Motivation**

Learning motivation is one of the main factors that determine the successful learning of foreign languages. This study divides language learning motivation into the personal development and language learning interest types. The former is an externally imposed learning motivation requirement, which learners establish with the intention of improving themselves and adapting to society. The latter is an internalized motivation that derives from an interest in learning.

(2) **Learning Environment**

For language learners, the language learning environment, which consists of multiple sub-environments, is a crucial factor that determines learning skills. Previous studies demonstrate that family economic status and parental education level have an important impact on learners' English achievement and learning confidence. School teaching conditions and the extracurricular learning atmosphere are also important factors that need to be taken into account, as they can influence the strategies of foreign language learners. The scientific credentials of curriculum design and teaching approaches and methodologies are also both sub-environments, and have an important impact on the mastery of foreign language skills.\cite{5} The learning environment will subtly influence the learning motivation of foreign language learners, and it is to be expected that different learning motivations will be reflected in the selection of learning environments. On this basis, hypothesis H1 is proposed.

H1: The learner's learning motivation and learning environment will interact.

(3) **Study Attitude**

Motivation Theory presents learning attitude as the key influence on learning. It has been shown that learning attitudes affect learning motivation, which establishes that positive learning attitudes will be reflected in positive learning motivations. But it can also be anticipated that learners will have different learning motivations. In different learning environments, learners will have different expectations of the foreign language level they are likely to attain, and this will be reflected in
divergent learning attitudes. Different learning attitudes will also produce different learning effects, which will culminate in entrance into different learning environments. On this basis, this study proposes hypotheses H2 and H3.

H2: Learners' learning attitudes and learning motivations will interact.
H3: The learning attitude of the learner and the learning environment will interact.

(4) Learning input
The concept of learning investment is around 70-years-old. It generally refers to the behavior learners evidence in their learning activities, and generally includes effort put into personal learning, learning intensity and time of input. [6] Scholars have shown that the stimulation of learning motivation will promote learners' input in foreign language learning; in addition, learners will further stimulate their language learning motivation by increasing their own input in language learning. Language learners in a good learning environment will have a large learning input; in addition, increased learning input is conducive to an improved language level and entry into a better learning environment. Those with positive learning attitudes will take the initiative in increasing their learning input, and this will be reflected in learning time and intensity. As their language level increases, they will develop a more active learning attitude. On this basis, this study proposes hypotheses H4, H5 and H6.

H4: Learners' learning input and learning motivation will interact.
H5: Learners' learning input and learning environment will interact.
H6: The learner's learning input and learning attitude will interact.

(5) Learning status
Studies of second language acquisition find that even if teachers adopt various teaching methods, some learners will attain excellence and others will fail. [7] Even learners located in the same learning environment will attain a different learning status. This study defines this status as the learning confidence shown in foreign language learning and external classroom performance (it includes both the level of classroom activity and the ease of play in the classroom). The ‘learning of the status quo’ is an explicit expression that foreign language learners use. Positive learning attitude will directly affect learning status, and learners with a positive attitude will show stronger learning confidence and better classroom performance. As time and energy input increase, learners will attain good language skills, and their confidence in foreign language learning and classroom performance will consequently improve. On this basis, this study proposes hypotheses H7 and H8.

H7: Learning attitude has a significant positive impact on the status quo of learning.
H8: Learning input has a significant positive impact on the status quo of learning.

Research Methods and Data Sources
The Structural Equation Model is a multivariate statistical tool that applies observed indicators to measure latent variables and the relationship/s between them. Learning attitude, environment, input, motivation and status can only be identified through other indicators. There are multiple interactions, rather than a single influence, and the Model highlights them particularly well.

The first part of the scale relates to respondent demographic variables, and the second to English learning behavior variables. All of the second part’s items are based on the Likert standard five-point scale, which ranges from ‘1’ (strongly disagree) to ‘5’ (strongly agree)

Data Collection
Pre-test work was initially conducted to ensure the reliability of the scale before 30 questionnaires were randomly distributed for pre-survey. The results show that the scale’s reliability and validity attained the standard. In the formal survey, 386 questionnaires were distributed to freshmen and sophomores on Hohai University’s Changzhou Campus; 326 were valid, and an effective rate of 84.5 percent was recorded.
Variable Interpretation and Data Description

Demographic variables in the first part of the scale include age, gender, and household registration. The second part of the English learning behavior variable divides into 5 dimensions and a total of 14 items. These are respectively: learning motivation (2 references to the title item), environment (4 references to the title item), attitude (2 references to the title item), input (3 references to the title item) and learning status (3 references to the title item).

Tool Application

On the basis of this scale data, the paper establishes a Structural Equation Model of English learning behavior, and analyzes the model’s accuracy and interaction between latent variables (in AMOS24.0).

Empirical Analysis

Questionnaire Reliability and Validity Test

The questionnaire’s reliability is measured by consistency (Cronbach'\(\alpha\) coefficient) and combination reliability (CR). When the Cronbach'\(\alpha\) value exceeds 0.7, the consistency of the questionnaire’s measurement indicators is good.\[8\] Questionnaire analysis shows that the total scale’s reliability coefficient is 0.867, and the Cronbach'\(\alpha\) coefficient for each latent variable exceeds 0.7 – this establishes that the scale has good internal consistency. The combined reliability of each latent variable is between 0.671 and 0.840, which exceeds 0.6, and the questionnaire’s combination reliability also passes the test.\[9\]

The scale validity is measured by referring to Convergence (also known as aggregation validity) and Discriminant Validity. The former is tested by examining the indicator’s standard factor load; the Average Variance Extracted (AVE). The result shows that the AVE values of each latent variable exceed 0.5, and the standard factor loads of each measurement index attain a significance level of 0.001, which confirms the scale has good Aggregation Validity.\[25\] Discriminant Validity compares the relationship between the square root of AVE and the correlation coefficient between each latent variable. The square root of AVE is greater than the correlation coefficient, which confirms the scale has good Discriminant Validity.

Fitting Degree Analysis

The Structural Equation Model (SEM) is a linear statistical modeling tool that is used in many fields, and it has been widely applied in Econometrics, Psychology, Sociology and other fields. This study uses the SEM method and AMOS24.0 software to analyze the factors that influence the English status of college students. The model’s fitness is mainly tested by referring to the Absolute Fitness Index (CMIN/DF, RMR, GFI, RMSEA), the Value-Added Fitness Parameter (CFI, NFI, IFI) and the Reduced Fitness Index (PNFI, PCFI, PGFI). The fitting results are that the values of each index meet the standard, and the fitness of the established model is found to be good.\[10\]

Hypothesis Test

The path coefficients of the model are calculated, and the model hypothesis is tested by applying path coefficients and the T-test. Path analysis shows that the learning motivation and environment standardized path coefficient is 0.41;*** it also shows that the learner's learning motivation and environment have a significant interaction effect (H1)—accordingly, when the "learning motivation" or "environment" score increases by 1, the "environment" and "motivation" score increases by 0.41; The standardized path coefficient of learning motivation and learning attitude is 0.82***, and the learner's learning motivation and learning attitude are found to significantly interact (H2); the standardized path coefficient of learning environment and attitude is 0.47***, and the learning environment and attitude are found to significantly interact (H3); standardized path coefficients between learning input/motivation, learning input/environment and input/attitude are respectively 0.70***, 0.31*** and 0.82***. Learning environment/motivation and environment/attitude are found to significantly interact ( H4, H5, H6); learning attitudes and inputs have significant
positive effects on learning status (H7, H8), and the path coefficients are respectively 0.50 and 0.37, which indicates that changes in the attitudes and inputs of foreign language learners can significantly improve their learning status.

The $R^2$ of learning status is 0.69, which indicates that all the model variables can explain the variation of the learning status (69 percent) and the minimum requirement (more than 10 percent) – this indicates that this study’s model has better explanatory power. The English learning behavior model and its results are shown in Figure 1.

Figure 1. English Learning Behavior Model and Result.

**Research Results and Countermeasures**

Data analysis of the questionnaire survey constructs the English Learning Behavior Model and combines it with current English teaching on Hohai University’s Changzhou Campus. This produces the following conclusions and targeted suggestions:

1. **It is very important to correctly guide the motivation for learning English**
   
   From a data perspective, the H1, H2 and H4 hypotheses are supported. Learning attitude, environment and input are found to have a strong influence that exceeds 0.5. Learning motivation potentially impacts on the learning situation. This paper recommends that the learning motivation should be correctly guided into the college English classroom; it also emphasizes the importance of active learning and advocates the selection of a motivating learning environment.

2. **It is important to cultivate an appropriate attitude towards English learning.**
   
   The Structural Equation Model results support the H3 and H5 hypotheses. This shows that 1) learning attitudes, inputs and environments significantly interact; 2) learning input and environment significantly interact; and 3) learning attitudes significantly impact each other. The learning attitudes of college students subtly influence learning input and learning environment, and also converge with the attitudes of surrounding learners. If college students possess an appropriate learning attitude, then the learning effect generally proceeds in a good direction.

3. **Ensuring the necessary learning input is the guarantee of effectiveness**
   
   The model results support the H7 and H8 hypotheses. They show that learning attitude and input have a significant positive impact on learning status, especially in instances where the impact of learning input exceeds 0.7. Learning input is reflected both inside and outside the classroom, and in indicators that include the level of classroom activity, relaxation and performance, along with learning confidence. Teachers should encourage college students to devote more energy to learning and students should, with the guidance and encouragement of teachers, approach learning with an active attitude.
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