

An Empirical Study on the Effect of Metacognitive Strategy Training on Chinese College Students' English Autonomous Learning Ability

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Abstract: This study investigates the current situation and the effects of metacognitive strategy training on college students' autonomous learning of English in China. It adopts a mixed-methods approach that combines quantitative and qualitative research methods to collect and analyze data from 201 participants. The results show that the English autonomous learning ability and metacognitive strategy application ability of college students in Tai'an area are at a medium level, and there is a significant strong correlation between the overall metacognitive strategy application ability and autonomous learning ability. Moreover, the study finds that metacognitive strategy training can effectively improve students' autonomous learning ability and English proficiency, which offers some practical implications and suggestions for English teaching and learning.

Keywords: Autonomous learning, Metacognitive strategy, English learning.

1. Introduction

Autonomous learning, which was first introduced by Holec (1981) as "the ability to manage one's own learning", is a key concept in foreign language teaching and learning. According to Holec (1981), autonomous learning mainly involves five aspects: "setting learning objectives, determining content and progress, selecting methods and techniques, monitoring acquisition process and evaluating learning outcomes". With the rapid development of the Internet+ education, autonomous learning ability has become more important. However, previous studies have shown that many college students in China lack clear learning plans, low subjective initiative, and insufficient awareness of autonomous learning of English (Xu, 2004; Li, 2019). Therefore, it is necessary to explore how to promote college students to effectively carry out autonomous learning of English. This can help them improve their language proficiency and learning outcomes under the background of Internet+ education.

The early research on promoting autonomous learning by domestic scholars finds that one of the factors that may influence autonomous learning is metacognitive strategy (Hua, 2002; Zhang, 2005), which refers to "management steps for successful learning of a foreign language" (O'Malley & Chamot, 1990). Metacognitive strategy can be divided into planning strategy, monitoring strategy and evaluation strategy (Yang, 2003). Some empirical studies have demonstrated that metacognitive strategy training can enhance metacognitive awareness and autonomous learning ability of college students (Yue & Shi, 2009; Liu, 2011). However, these studies also have some limitations, such as small sample size, short experiment time, or lack of control group.

To date, most of the domestic research on autonomous learning is theoretical research and current situation investigation. There is relatively little research on promoting autonomous learning and the correlation between the effect of metacognitive strategy and autonomous learning. At present, under the concept of "people-oriented" and "lifelong learning", the focus of foreign language teaching has shifted

with the change of social needs. Teacher teaching is no longer the only way to learn English. In the context of Internet+ education, strengthening students' autonomous learning ability will help expand their own knowledge and skills and achieve multi-faceted autonomous learning. Therefore, how to cultivate students' autonomous learning ability has become a hot spot and trend of foreign language teaching research and practice.

This paper aims to investigate the English autonomous learning ability and metacognitive strategy application ability of local college students in China. It can help students and teachers understand the current situation of autonomous learning and metacognitive strategy application ability, improve their self-awareness, and help teachers carry out a series of strategy training by exploring the correlation between autonomous learning and metacognitive strategies. It can optimize students' learning effect, promote students' and teachers' innovation in future English teaching and learning mode. The research questions are as follows:

- (1) What are the current levels of autonomous learning ability and metacognitive awareness of college students in China?
- (2) How does metacognitive strategy training affect college students' metacognitive awareness and autonomous learning ability of English?

2. Theoretical Framework

This paper is based on three main theories: humanistic theory, second language acquisition theory, and metacognitive theory. These theories provide meaningful guidance and inspiration for the research on college students' autonomous learning of English and metacognitive strategy training.

2.1. Humanistic Theory

Humanistic theory of education is mainly derived from humanistic psychology, which emerged in the United States in the 1950s, emphasizing "human nature and its relationship with the external world", valuing holistic and harmonious development, and having positive implications for current

education. One of the main representatives of this theory is Rogers, who proposed the theory of “self-actualization” and argued that people have an innate “need for self-actualization”, which is the driving force for self-development (Zhang, 2020). Based on the theory of “self-actualization”, Rogers advocated a “student-centered” educational view, believing that teachers should develop students’ potential for autonomous learning and strive to promote students’ self-development. Humanistic theory holds that people are born with the nature of active learning, which can effectively promote the potential of human beings. Therefore, effective education is not only the teaching of basic knowledge in the traditional sense, but also the cultivation of students’ continuous learning motivation. It can be seen that humanistic theory lays a theoretical foundation for the related research on college students’ English autonomous learning ability cultivation, and provides inspiration for modern English teaching. The current English teaching should not only provide students with necessary learning resources, but also pay attention to students’ learning attitude and motivation, and strive to make students complete learning tasks actively. Therefore, college English teachers should try to create an atmosphere conducive to stimulating students’ autonomous learning, and help students achieve self-regulation and autonomous learning.

2.2. Second language Acquisition Theory

Second language acquisition theory provides meaningful guidance for English teaching practice from the perspective of language teaching. As early as in the 1970s, American linguist Krashen proposed the “language acquisition” theory, arguing that people master a language mainly through two ways: acquisition and learning. Among them, “acquisition” refers to the process in which second language learners acquire relevant knowledge of the language unconsciously through communicative practice, and can use the language correctly unconsciously; while “learning” refers to the process of consciously studying and rationally learning a language. Krashen believed that people who master a language through “acquisition” can communicate fluently in that language, while those who master a language through “learning” can only use language rules to monitor their language output. As the language level improves, the use of this monitoring will become less and less. Therefore, learners’ second language acquisition cannot rely solely on teachers’ teaching of language knowledge, but more importantly on learners’ own active and autonomous learning. Students should be the subject of learning, while teachers are the organizers, stimulators and guides in the process of language acquisition. Teachers should create a relaxed and pleasant language acquisition environment, stimulate students’ interest and creativity, and enable students to learn actively.

2.3. Metacognitive Theory

Metacognitive theory is another important theoretical basis for this paper. The concept of metacognitive strategy was first proposed by American psychologist Flavell in 1976. It is a typical learning strategy, which is learners’ self-awareness and self-regulation, and is an “executive skill” that ensures the success of learning activities (Brown et al., 1983). Based on metacognitive theory, students can effectively monitor their cognitive processes and outcomes. Wen (2010) found in her research on metacognitive strategies based on English majors that there were significant differences in

metacognitive strategies between learners with significant learning effects and those with unsatisfactory learning effects. Metacognitive strategies are also successful steps for acquiring a foreign language (O’Malley & Chamot, 1990), including setting learning goals, monitoring learning processes and evaluating learning outcomes. It can be seen that both metacognitive strategies and autonomous learning emphasize setting goals, self-monitoring and regulation. By further investigating the correlation between metacognitive strategies and autonomous learning, some teaching implications can be provided for how to promote learners’ autonomous learning ability based on metacognitive theory.

3. Methodology

The methodology of this paper consists of two main steps: participants selection, data collection. The paper adopts a mixed-methods approach that combines quantitative and qualitative research methods to investigate the current situation and the effects of metacognitive strategy training on college students’ autonomous learning of English.

3.1. Participants

The participants of this paper were non-English major undergraduates from two colleges in Tai’an City: the Tourism College of Taishan University and the School of Computer Science and Engineering of Shandong University of Science and Technology. At the beginning of the project, two classes (83 students) from the Tourism College and two classes (118 students) from the School of Computer Science and Engineering were selected as the research subjects, totaling 201 students, to participate in a questionnaire survey on the current situation of autonomous learning and metacognitive strategy use. Then, a comparative experimental study was carried out in the two classes of the Tourism College, in order to explore the effectiveness of metacognitive strategies in improving students’ autonomous learning ability and learning outcomes.

3.2. Data Collection Method

The data collection methods included questionnaire, test, and interview. The questionnaire was designed based on the literature review and the theoretical framework, and it consisted of two parts: one part measured the level of autonomous learning ability, and the other part measured the frequency of metacognitive strategy use. The questionnaire used a five-point Likert scale, with scores ranging from 5 to 1. The test was used to measure the English proficiency level of the participants before and after the experiment. The test included four sections: listening, reading, writing, and speaking. The interview was used to collect qualitative data on the participants’ perceptions, attitudes, and experiences of autonomous learning and metacognitive strategy training. The interview was semi-structured and conducted in Chinese.

4. Results and Analysis

The results and analysis of this paper are presented according to the sequence of the research questions. The first research question is about the current situations of autonomous learning ability and metacognitive strategy application ability of college students in China. To answer this question, the paper uses descriptive statistics and correlation analysis to analyze the questionnaire data collected from 201 participants. The second research question is about the effects

of metacognitive strategy training on college students' autonomous learning ability and English proficiency. To answer this question, the paper uses inferential statistics and thematic analysis to compare and contrast the test scores and the interview data of the experimental group and the control group before and after the experiment. The details are as follows.

4.1. Questionnaire Data

4.1.1. Survey on the Current Situation of Autonomous Learning Ability

In order to understand the current situation of college students' autonomous learning ability in the context of

informatization, the author used Xu's (2004) questionnaire on the autonomous English learning ability of non-English major college students. The questionnaire covers five aspects of autonomous English learning ability, including "understanding the teaching objectives and requirements of teachers (1-5), setting learning goals and plans (6-10), using learning strategies effectively (11-15), monitoring the use of learning strategies (16-22), and monitoring and evaluating the English learning process (23-32)", with a total of 32 questions. The questionnaire options are graded using a Likert five-point scale, with scores ranging from 5 to 1. After collecting the data from the questionnaire, this study used SPSS to analyze the data and obtained the following relevant data.

Table 1. Statistical Analysis of autonomous Learning Ability of Students from Taishan College

Survey Content	Number of People	Maximum Value	Minimum Value	Mean Value	Standard Deviation
Understanding the teaching objectives and requirements of teachers	83	4.800	1.600	3.321	.593
Setting learning goals and plans	83	4.600	1.400	3.065	.617
using learning strategies effectively	83	4.200	1.000	2.984	.576
monitoring the use of learning strategies	83	4.167	1.000	2.957	.498
monitoring and evaluating the English learning process	83	4.200	1.120	3.06	.512
Overall evaluation of English autonomous learning ability	83	4.342	1.460	3.077	.479

Table 2. Statistical Analysis of autonomous Learning Ability of Students from Shandong University of Science and Technology (Tai'an Campus)

Survey Content	Number of People	Maximum Value	Minimum Value	Mean Value	Standard Deviation
Understanding the teaching objectives and requirements of teachers	118	5.000	1.600	3.462	.516
Setting learning goals and plans	118	4.800	1.000	3.107	.573
using learning strategies effectively	118	4.800	1.000	3.029	.594
monitoring the use of learning strategies	118	4.500	1.000	3.078	.472
monitoring and evaluating the English learning process	118	4.700	1.400	3.316	.448
Overall evaluation of English autonomous learning ability	118	4.560	1.460	3.162	.411

According to Table 1 and Table 2, the autonomous learning ability of Taishan College students is slightly lower than that of Shandong University of Science and Technology (Tai'an Campus) students, but overall, the autonomous learning ability of Taishan College and Shandong University of Science and Technology (Tai'an Campus) students is at a medium level (mean value >3), which is different from the previous research result that "college students' autonomous learning ability is generally low" (Xu, 2004). The reason for this difference may be partly due to the different number and composition of the experimental samples, and partly due to the fact that under the background of education informatization, students' autonomous learning ability has indeed improved with the introduction of various policies and the deepening of college English teaching reform.

From the five aspects of autonomous learning ability, students generally scored the highest in "understanding the teaching objectives and requirements of teachers", which is relatively the strongest ability, indicating that students generally have a clear understanding of the teachers' teaching

goals and requirements, which is also the basic requirement for effectively completing a class, as Xu (2004) believed that "only in this way can students actively further understand the teachers' teaching objectives and transform them into their own learning objectives." Secondly, students performed relatively well in "setting learning goals and plans" and "monitoring and evaluating the English learning process", indicating that students have a certain ability to plan their own learning activities independently, and can monitor their own learning process well. According to Little's (1991) view that "learners who can fully plan, monitor and evaluate their own learning in the learning process are completely autonomous learners", students currently have the basic ability of autonomous learning to some extent. But according to the data collected by the questionnaire, students' ability in "using learning strategies effectively" and "monitoring the use of learning strategies" is lacking. But Zhang's (2005) research showed us that "the stronger the awareness of using learning strategies, the more complete the process of autonomous learning and the better the effect". Therefore, college teachers

should pay attention to the guidance and training of students' learning strategies in future English teaching.

4.1.2. Survey on the Current Situation of Metacognitive Strategy Use

To further understand the current situation of students' metacognitive strategy use, this survey adopted Wen's (1995) questionnaire and the items related to metacognitive strategies in Oxford's (1990) language learning strategy scale.

The questionnaire consisted of 15 questions, mainly covering three aspects of metacognitive strategies: planning strategies (1-5), monitoring strategies (6-10), and evaluation strategies (11-15). The questionnaire options were graded using a Likert five-point scale, with scores of 1-5 indicating "completely disagree", "usually disagree", "sometimes agree", "usually agree", and "completely agree" respectively. After the survey was completed, the data were analyzed using SPSS, and the results are shown in the following table.

Table 3. Statistical Analysis of the Use of Metacognitive Strategies by Taishan College Students

Survey Content	Number of People	Maximum Value	Minimum Value	Mean Value	Standard Deviation
Planning strategies	83	5.000	1.600	3.134	.673
Monitoring strategies	83	4.800	1.000	3.017	.591
Evaluation strategies	83	4.800	1.400	2.972	.546
Overall Evaluation of Metacognitive Strategies	83	4.533	1.600	3.036	.635

Table 4. Statistical Analysis of the Use of Metacognitive Strategies by Students from Shandong University of Science and Technology (Tai'an Campus)

Survey Content	Number of People	Maximum Value	Minimum Value	Mean Value	Standard Deviation
Planning strategies	118	5.000	1.400	3.243	.629
Monitoring strategies	118	4.800	1.600	3.175	.577
Evaluation strategies	118	5.000	1.200	2.298	.613
Overall Evaluation of Metacognitive Strategies	118	4.730	1.600	3.236	.598

According to the results of Table 3 and Table 4, the metacognitive strategy application ability of Taishan College students and Shandong University of Science and Technology (Tai'an Campus) students is at a medium level (mean value > 3) based on the interpretation of the mean value of the Oxford Learning Strategy Scale. Compared with the two schools, the metacognitive strategy application ability of Taishan College students is slightly weaker than that of Shandong University of Science and Technology (Tai'an Campus) students, which is consistent with the survey results of the current situation of autonomous learning ability. From the three aspects of metacognitive strategies, Taishan College students generally perform better in planning strategies, while monitoring strategies and evaluation strategies are weaker. In contrast, Shandong University of Science and Technology students perform well in both planning strategies and evaluation strategies, while monitoring strategies are slightly worse. This result is basically consistent with the performance of students from the two schools in the corresponding aspects of "setting learning goals and learning plans", "monitoring the use of learning strategies", and "monitoring and evaluating the English learning process" in the survey of the current situation of autonomous learning ability.

4.1.3. Correlation between Metacognitive Strategies and Autonomous Learning Ability

Based on the survey and analysis of the current situation of students' autonomous learning ability and metacognitive

strategy application ability, the author further conducted a correlation analysis between the overall metacognitive strategies and their three categories of strategies and the overall autonomous learning and its five dimensions. The results are shown in the following table (Table 5).

According to the results, the overall metacognitive strategy application ability and its three categories of strategies have a significant strong correlation with the autonomous learning ability (the correlations are close to 1); the overall autonomous learning ability and its five dimensions have a significant strong correlation with the overall metacognitive strategies (the correlations are close to 1). This is consistent with previous research results (Liu, 2011; Tan, 2015). Therefore, the experiment of enhancing students' autonomous learning based on metacognitive strategy training is feasible.

4.1.4. Comparison of Students' Autonomous Learning Ability, Metacognitive Strategy Application Ability and English Proficiency before and after the Experiment

To further investigate the effectiveness of metacognitive strategy training on enhancing students' autonomous learning ability and English proficiency, the author carried out an experimental study in two classes of Taishan College that participated in the survey questionnaire. The study lasted for one semester, during which the students in the experimental class received metacognitive strategy training while the students in the control class followed their regular curriculum. Both groups were assessed by English tests and survey

questionnaires before and after the intervention. The data were analyzed using SPSS software. An independent samples T-test was performed to compare the mean scores of the two

groups on each outcome variable. The results are presented in Table 6 and Table 7.

Table 5. The Pearson Correlation Analysis between Autonomous Learning Ability and Metacognitive Strategies

Metacognitive Strategies and Autonomous Learning Ability		Autonomous Learning Ability and Metacognitive Strategies	
Strategies	The overall evaluation of Autonomous Learning Ability	Autonomous Learning Ability	The overall evaluation of Metacognitive Strategies
Planning strategies	.697	Understanding the teaching objectives and requirements of teachers	.674
Monitoring strategies	.714	Setting learning goals and plans	.645
Evaluation strategies	.659	using learning strategies effectively	.733
Overall Evaluation of Metacognitive Strategies	.756	monitoring the use of learning strategies	.721
		monitoring and evaluating the English learning process	.702
		Overall evaluation of English autonomous learning ability	.756

Table 6. Analysis of the Pre-test Scores of the Experimental Class and the Control Class

Group	Number of people	Mean Value (English proficiency)	P-value	Mean Value (Metacognitive Strategy)	P-value	Mean Value (Autonomous learning ability)	P-value
experimental class	42	63.356	.418	3.029	.671	3.075	.657
control class	41	64.183		3.043		3.079	

Table 7. Analysis of the Post-test Scores of the Experimental Class and the Control Class

Group	Number of people	Mean Value (English proficiency)	P-value	Mean Value (metacognitive strategy)	P-value	Mean Value (autonomous learning ability)	P-value
experimental class	42	69.450	.031	3.342	.026	3.461	.44
control class	41	66.561		3.176		3.207	

Table 6 shows that the mean scores and standard deviations of the two classes were similar, and the p-values were 0.418, 0.671, and 0.657, respectively, which were clearly larger than 0.05. This indicates that the two classes did not have statistically significant differences in their English performance, autonomous learning ability, and metacognitive strategy application ability, which met the experimental conditions. Table 7 shows that after a semester of learning, both classes improved their English test, autonomous learning ability, and metacognitive strategy scores, but the experimental class made more progress. The mean score of the experimental class changed from being lower than the control class to being higher than the control class, with a p-value of 0.031, which met the statistical significance criterion. The autonomous learning ability and metacognitive strategy application ability of the experimental class also increased significantly. This suggests that the teaching model based on metacognitive strategy training was effective.

4.2. Interviews

To complement and understand the actual learning situation of the students in the experimental group, and to ensure the validity of the data collected, the author also conducted semi-structured interviews with some of the participants. The content mainly focused on the effectiveness

of the teaching model based on metacognitive strategy training on their learning performance and autonomous learning ability. The interview results showed that the participants all agreed that this metacognitive strategy training had a positive impact on their learning outcomes. Through the relevant training, they could better formulate English learning plans, establish learning goals, and use online resources for autonomous learning. Moreover, in their daily English learning, they could actively preview and review, learn to use effective learning methods and monitor and adjust their methods and strategies in time during autonomous learning. They also regularly evaluated their own learning outcomes and summarized and reflected on them. In addition to improving their autonomous learning ability, the participants also reported that based on this training, they greatly increased their interest in English learning, which made their English learning more efficient and enjoyable.

5. Conclusion and Implications

According to the findings of the data analysis and the research questions, the paper found that under the trend of informatization, the English autonomous learning ability and metacognitive strategy application ability of college students in Tai'an area are at a medium level. It also shows that there

is a significant strong correlation between the overall metacognitive strategy application ability and its three categories of strategies and autonomous learning ability. Moreover, the paper proves that metacognitive strategy training can to some extent improve students' autonomous learning ability and English proficiency.

The findings of this paper have certain practical significance and guidance value for English teaching and learning. Teachers should give full play to the guiding role of metacognition theory in cultivating students' autonomous learning ability in English teaching, and encourage students to actively participate in learning activities such as making learning plans, setting learning goals, selecting learning content, and providing feedback on learning outcomes. Secondly, schools can also appropriately hold a series of lectures or offer elective courses on learning strategy training according to the situation to help more students enhance their awareness and ability of using metacognitive strategies, so as to better cultivate students' autonomous learning ability. In addition, under the background of informatization, teachers should change their traditional teaching concepts, reform their teaching modes, realize the role transformation from "transmitter" to "guide", take students as the center, strive to create an environment for independent thinking and autonomous learning for students, and cultivate students' awareness and ability of autonomous learning and cooperative learning.

6. Limitations

The limitations of this paper are mainly related to the sample size, the experimental duration, and the data collection methods. Due to the relatively limited number of samples participating in the current situation survey, the relatively small number of experimental samples participating in the controlled experiment, and the relatively short experimental period, these problems have caused limitations to the generalizability and reliability of the research results. Moreover, due to the time and resource constraints, the paper only used questionnaire, test, and interview as the data collection methods, which may not capture all the aspects and nuances of autonomous learning and metacognitive strategy training. Therefore, future research may consider using more diverse and comprehensive data collection methods, such as observation, diary, or portfolio. This paper made a beneficial

attempt to improve students' autonomous learning ability based on metacognitive strategy training, which laid a good foundation for further in-depth research and teaching practice in the future.

References

- [1] Gao, P., & Zhang, X. Z. (2005). Cultivating Learner Autonomy in College English Classrooms: A report of an experimental study on autonomous classroom teaching model. *Foreign Languages in China*, (1), 33-39.
- [2] Hua, W. F. (2003). A Report on Establishing an English Autonomous Learning Center. *Foreign Languages in China*, (6), 43-48.
- [3] Holec, H. (1981). *Autonomy and Foreign Language Learning*. Oxford: Pergamon.
- [4] Little, D. (1991). *Learner Autonomy: Definitions, Issues and Problems*. Dublin: Authentic.
- [5] Li, X. (2019). A Study on College Students' English Autonomous Learning Ability in the Context of "Internet +" era. *Overseas English*, (23), 104-105.
- [6] Liang, Y., & Li, H. L. (2009). Production of Classroom Recordings of Foreign Language Quality Courses Based on Online Autonomous Learning Needs. *Science and Technology Information*, (35), 571-572.
- [7] Liu, M. X. (2011). An Empirical Study on Cultivating Learners' Autonomous Learning Ability Based on Metacognitive Strategies. *Journal of Xi'an University of Arts and Science: Social Science Edition*, 14(2), 101-103.
- [8] O'Malley, J. M., & Chamot, A. U. (1990). *Learning Strategies in Second Language Acquisition*. Cambridge University Press.
- [9] Pang, G. W. (2003). *Autonomous Learning: Principles and Strategies of Learning and Teaching*. East China Normal University Press.
- [10] Xu, J. F. (2004). Investigation and Analysis of Autonomous English Learning Ability of non-English Majors. *Foreign Language Teaching and Research (Bimonthly)*, (1), 64-68.
- [11] Yang, J. D. (2003). Metacognitive Strategy Training in Listening Teaching. *Foreign Language Teaching*, 24(4), 65-69.
- [12] Yue, H. P., & Shi, Z. Y. (2009). An Empirical Study on College English Autonomous Learning Metacognition. *Foreign Language Research*, (4), 63-67.