

# Research on English Learning Strategies in Junior High Schools Based on Cognitive Load Theory

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Received: March 13, 2022

Accepted: March 29, 2022

Online Published: January 11, 2023

doi:10.5430/ijelt.v10n1p1

URL: <https://doi.org/10.5430/ijelt.v10n1p1>

## Abstract

In the case of advocating autonomous learning and lifelong learning, learners need to master English learning strategies and use them effectively. How to exert functions of English learning strategies is a key issue that needs to be solved. In this study, the revised The Strategy Inventory for Language Learning (SILL) to design a questionnaire and interviews were conducted to understand the current situation of English learning strategies used by junior high school students. Then, in order to augment students' initiative in using learning strategies, based on the cognitive load theory, this study proposed six strategies. First, decrease internal cognitive load: reducing elements and linking old and new knowledge. Second, decrease external cognitive load: setting goals and reducing redundancy. Third, increase germane cognitive load: stimulating learning motivation and multi-modal training.

**Keywords:** English learning strategies, junior high school students, cognitive load, effectiveness

## 1. Introduction

In the context of lifelong learning, the learning effect and efficiency of English learners are a question worth thinking about. Since the founding of the People's Republic of China, the topic of burden reduction has not stopped being discussed and studied. Until 2021, China introduced the "double reduction" policy. At present, it is in the process of reducing the burden of homework for students and the burden of off-campus training institutions. However, a question which is worthy of thinking about is whether reducing the load means simply reducing students' academic load. Is it just to relieve the pressure from outside? Obviously not. To reduce the burden, we must focus on the essential things, not only to reduce students' academic burden, but also to reduce their psychological burden.

It is true that learning strategies are a series of methods for learners to consciously improve the efficiency and effectiveness of learning, but the effectiveness of using learning strategies effective depends on whether it is within the acceptable range of the total cognitive load of the learners when using them. Therefore, attaching importance to the cultivation of students' effective use of learning strategies is an important part of improving their learning efficiency. Exploring and summarizing the effective ways of using English learning strategies are significant to reduce the burden on students and to comprehensively improve the quality of students and education.

## 2. Literature Review

The definition of learning strategies is given in the *English Curriculum Standards for Compulsory Education (2011)*. It refers to "the various actions and steps students take in order to effectively learn and use English and beliefs that guide these actions and steps" (Ministry of Education, 2011). *National English Curriculum Standards for General High School (2017 version revised in 2020)* incorporate learning strategies into the curriculum content and considers them as the main part of learning ability, which is one of core competences in English subject, as does the *Compulsory Education English Curriculum Standard (2022)*. The English Curriculum Standards states that the effective use of learning strategies can help improve students' effectiveness and efficiency in learning English (Ministry of Education, 2020). Rubin (1975) summed up the seven strategies of good language learners, and firstly put forward the concept of language learning strategies. Current research achievements can be summarized into the

following three aspects.

First, there are different opinions on the definition of language learning strategies, among which typical ones are listed. Stern (1983) believed that learning strategies are used to refer to the general trends or general characteristics of language learners' methods. Oxford (1989) held language learning strategies are the behaviors or actions taken by learners in order to make language learning more successful and enjoyable. Cohen (1998) thought that learning strategies refer to behavioral and psychological activities that learners make efforts to make the learning of language knowledge and language skills easier, or to make up for the lack of language knowledge. In short, in terms of purpose, language learning strategies are to improve the effect and efficiency of language learning.

Second, there are many early studies on the classification of language learning strategies, among which Oxford divided these strategies into more comprehensive and specific ones. O' Malley and Chamot's (1990) classification, although it's less hierarchical, it has similarities with Oxford's classification in that they both affirm the importance of meta-cognitive and affective strategies. Different from them, Wen Qiufang (1993), according to Skehan's point of view, divided strategies into two categories: management strategies and language learning strategies. Highlights of these various classifications absorbed, new Curriculum Standards divided the learning strategies into meta-cognitive strategies, cognitive strategies, communication strategies, and affective strategies.

The third category is the measurement and investigation of language learning strategies. The Strategy Inventory for Language Learning (SILL) compiled by Oxford has been widely used in second language acquisition research in China, but its reliability and validity in the Chinese environment have not been studied in depth. Yao Xiaojun et al. (2021) used Cronbach's  $\alpha$  to examine the reliability of the scale and obtained a revised version of SILL with satisfactory reliability and validity by deleting some items. There are also many scholars, such as Fang Yigui (2010), Ma Ke (2012), Yang Fang et al. (2019), Cui Yaping (2018), Gu Shiming (2020), Song Biao (2009), through investigation to analyze the correlation between learning strategies and grades, and the factors that affect the use of language learning strategies.

Retrospecting the literature results existing to the present, it can be found that the range of research objects is very extensive, mainly reflected in the research content and research objects. First of all, there are related studies involving the use of strategies, strategy training, correlation research and so on. Furthermore, the research objects are constantly expanding, with different age stages, ethnic groups, and majors, so as to have a more in-depth understanding of the awareness and use of language learning strategies in various groups. However, college students always account for a larger proportion, and as the key stage of learning strategy training junior high school, there are a few related studies.

This study focuses on the following research questions. Firstly, what's the current situation of junior high school students' use of English learning strategies? What's its cause? Secondly, do junior high school students learn and use English learning strategies beyond their cognitive load? Thirdly, what teaching strategies can teachers adopt to improve students' initiative and effectiveness in using English learning strategies? Therefore, this paper investigates the use of English learning strategies in Grade 9 in order to find out the problems and causes in the teaching of English learning strategies, so that teachers can clearly understand the current situation and characteristics of English learning strategies used by junior high school students. Then, based on the cognitive load theory, it proposes methods and measures to optimize the teaching of English learning strategies, and teachers adjust their own teaching strategies and teaching methods accordingly, so that students can learn efficiently not only in class but also outside class, reducing students' study load.

### 3. Theoretical Basis

Cognitive Load Theory is chosen as the theoretical foundation in investigation of junior school students' using language learning strategies. The following discussed what views it holds, what cognitive load is and its types.

#### 3.1 The Connotation and Basic Viewpoints of Cognitive Load Theory

Cognitive load theory was first proposed by Australian cognitive psychologist John Sweller in 1988. Sweller (1988) believed that cognitive load is the level of "mental energy" required to process information. Based on the theory of the Limited Resources Theory and Schema Theory, he examined cognitive load from the perspective of resource allocation, and divides cognitive load into three categories, namely internal cognitive load, external cognitive load and related cognitive load. The sum of the three cognitive loads is the total cognitive load, that is, the total cognitive load (Sweller, Van Merriënboer, & Paas, 1998; Paas, Renkl, & Sweller, 2003). The basic ideas of cognitive load theory are as follows:

Firstly, the total amount of cognitive resources required by individuals to learn is not overloaded, or their learning is ineffective. Human memory mainly includes working memory and long-term memory. Short-term memory is the main place for information processing, and its capacity is very limited, while long-term memory has a large capacity. Due to the limited capacity of working memory, overload occurs when learners are trying to solve complex problems. This overload restrains the learning. Therefore, only learning processes that avoid overload on cognition mean effective learning.

Second, schema acquisition and automation can effectively reduce workload and improve learning efficiency. Knowledge is stored in long-term memory with schema as a carrier. When an individual constructs knowledge, much information is contained as one element and are stored in long-term memory with schema as a carrier. When an individual learns new knowledge, it can help the individual to classify quickly and accurately. This classification is an automated process that can make up for the lack of working memory. Therefore, the more schemes related to new knowledge in an individual's long-term memory, the higher the degree of automation, the less cognitive resources are required, and the cognitive load is reduced, thereby improving learning efficiency.

In short, the purpose of cognitive load theory is to minimize the cognitive load that hinders learning in the design of teaching materials and the teaching process, and increase the cognitive load that promotes learning, so that learners can reasonably use limited cognitive resources and achieve the maximum of learning effect (Ruan, 2016).

### *3.2 Types of Cognitive Load*

Cognitive load affecting working memory can be divided into three categories: intrinsic cognitive load, external cognitive load, and germane cognitive load.

#### *3.2.1 Intrinsic Cognitive Load*

Intrinsic cognitive load refers to the load caused by the difficulty level of the learning material itself. The difficulty of learning materials can be divided into two aspects: absolute difficulty and relative difficulty. Absolute difficulty refers to its own complexity, and relative difficulty refers to the different reflections of the same learning materials on learners of different knowledge levels (Pang, 2011). For the same material, different learners may experience different levels of difficulties and complexity due to different prior knowledge and experience. If the learner has already had a wealth of knowledge about the learning materials, he can quickly incorporate these materials into the existing schema, so that there are few elements to be processed in the working memory, relatively, it also reduces the burden of the learner's working memory, resulting in a lower intrinsic cognitive load (Ruan, 2016). That is to say, the intrinsic cognitive load depends on the nature of the learning material and the knowledge level of the learner. Therefore, the learner can reduce the intrinsic cognitive load by improving their own ability level.

#### *3.2.2 Extraneous Cognitive Load*

Extraneous cognitive load is also called ineffective cognitive load, which is the load caused by content unrelated to learning activities. If the design and presentation of learning materials are inappropriate, it is easy to bring a high external load to the learners and interfere with their learning. For example, if a reading material is simply presented in text, too much text description will increase the external cognitive load of students; however, if a schematic diagram plus text description is used, the external load of students will be reduced, and the learning effect will be better. Therefore, teachers can reduce external cognitive load by optimizing the teaching design, reducing unnecessary teaching activities, or changing the way learning materials are presented.

#### *3.2.3 Germane Cognitive Load*

Germane cognitive load is the resource of working memory occupied by students' schema construction and automation process. This kind of cognitive load not only does not hinder learning, but also promotes learning, so it is called effective cognitive load (Shi, 2015). For example, students taking notes while listening to class, although this increases their cognitive load, it promotes comprehension and retention of knowledge. However, cognitive load cannot be correlated indefinitely. Therefore, good instructional design will moderately increase germane cognitive load of students, thereby promoting learning.

## **4. Research Design**

This study comprehensively used questionnaire survey and interview method to investigate 39 students in Grade 9 and a teacher, aiming to understand the current situation of students' use of English learning strategies and analyze its influencing factors, so as to provide a factual basis for the cultivation of English learning strategies.

#### 4.1 Participants

First of all, a total of 45 questionnaires were distributed in a certain class of the third grade of C middle school in Sichuan Province in this survey, and 42 questionnaires were recovered, with a recovery rate of 94%, of which 39 were valid questionnaires, with an effective rate of 93%. Therefore, the survey object of this study is 39 junior high school students, including 17 boys, accounting for 43.59% of the surveyed population, and 22 girls, accounting for 56.41% of the surveyed population. The results of the survey respondents are shown in table 1. In addition, the interview object of this research is a junior high school English teacher, the teacher is a young teacher with three years of work experience, who has a bachelor's degree, majoring in English teacher education.

**Table 1.** Scores of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	135-150	2	5.1	5.1	5.1
	120-134	8	20.5	20.5	25.6
	105-119	13	33.3	33.3	59.0
	90-104	6	15.4	15.4	74.4
	75-89	5	12.8	12.8	87.2
	Below 75	5	12.8	12.8	100.0
	Total	39	100.0	100.0	

#### 4.2 Methods

Literature research method. At the beginning of the research, review the research on language learning strategies, collect literature on cognitive load, and preliminary sort out the main viewpoints of cognitive load theory. Analyzing literature related to instructional design lays the groundwork on how to improve the effectiveness of using English learning strategies.

Questionnaire method. This research method is mainly used to understand the current situation and causes of English learning strategies used by junior high school students. A questionnaire with high reliability and validity revised by Yao Xiaojun et al. (2021) is used to investigate junior high school students. There are six dimensions in this questionnaire: memory strategies, cognitive strategies, compensation strategies, meta-cognitive strategies, affective strategies and social strategies. There are 4 questions in each dimension, and the total number of questions is 24. For each question, 5 levels are given to choose: never, seldom, sometimes, usually and always.

Interview method. On the one hand, according to the questionnaire results, targeted interviews are conducted with junior high school students to deeply analyze the causes affecting their selection and use from the perspective of students. On the other hand, according to the English teachers' understanding of English learning strategies and strategy training, targeted interviews are conducted to analyze the factors affecting the level of students' strategy use from the perspective of teachers.

### 5. Results and Discussion

First of all, the reliability and validity of the questionnaire are analyzed. The KMO of the six dimensions respectively is 0.803, 0.817, 0.77, 0.817, 0.772 and 0.834, all of which are higher than 0.7, indicating good validity. Besides, the Cronbach's  $\alpha$  of 24 questions is 0.973, indicating good reliability.

#### 5.1 Grade 9 students' Overall Situation of Using of English Learning Strategies

In following table 2 and 3, S1-S4, S5-S8, S9-S12, S13-S-16, S17-S20, S21-S24 respectively belong to memory strategies, cognitive strategies, compensation strategies, meta-cognitive strategies, affective strategies and communicative strategies. From the data of two tables, findings are as follows.

**Table 2.** Mean and Stand Deviation of Each Strategy

	Strategies	Mean	Order	Std. Deviation
Memory strategies	S1. Contact old and new English knowledge	3.69	12	1.05
	S2. Imagine new word usage situations	3.72	10	1.06
	S3. Use phonology to memorize new words	3.77	9	1.14
	S4. Remember the location of words	3.64	14	0.86
Cognitive strategies	S5. Practice pronunciation	3.95	2	1.00
	S6. Use new words in different ways	3.9	4	1.00
	S7. Make English conversation	3.41	20	0.99
	S8. Read English for leisure	3.49	17	1.14
Compensation strategies	S9. Guess the meaning of words	3.72	11	1.10
	S10. Doesn't look up every word	3.87	5	1.07
	S11. Predicting the following	3.33	21	1.16
	S12. Substitute unknown words	3.85	6	1.25
Meta-cognitive strategies	S13. Pay attention to mistakes	3.79	7	1.04
	S14. Consider methods	3.95	3	1.12
	S15. Look for more opportunities to learn English	3.62	16	1.23
	S16. Think about my progress	3.79	8	1.09
Affective strategies	S17. Encourage myself	3.97	1	1.01
	S18. Give myself a reward or treat	3.64	15	1.26
	S19. Pay attention to whether I am nervous	3.46	19	1.29
	S20. Share learning experiences with others	3.21	24	1.27
Communicative strategies	S21. Ask someone to slow down or repeat	3.67	13	1.03
	S22. Ask an English-speaker for help	3.49	18	1.17
	S23. Ask questions in English	3.31	22	1.15
	S24. Understand culture	3.23	23	1.23

Firstly, students in the ninth grade of C middle school have no obvious preference for using English learning strategies. According to Oxford's (1989) interpretation of the average score of the language learning strategy scale, an average score of 4.5-5 means that the learning strategy is always used. 3.5-4.4 means that the learning strategy is usually used. 2.5-3.4 means that the use situation is average. 1.5-2.4 means that the strategy is seldom used. 1.0-1.4 means that the strategy is rarely used. As can be seen from Table 2, except for communicative strategies, which shows lower frequency, the other five types of strategies (memory strategies, cognitive strategies, compensation strategies, meta-cognitive strategies and meta-cognitive strategies) are usually used. This may be due to the influence of exam-oriented education. As senior high school entrance examination is approaching, students have no time to communicate but to spend a lot of time doing English exercises.

Secondly, in the use of each strategy, there is no obvious polarization phenomenon. The overall difference is little, since all standard deviations of 24 strategies are around 1. Among them, three items with the largest standard deviations (S18, S19, S20) belong to affective strategies, which shows that there are great differences in these aspects. Some students realized the influence of affective factors on English learning, while others just focus on language knowledge itself, ignoring the affective factors.

**Table 3.** The Frequency of Using English Learning Strategies

Strategies	Never	Seldom	Sometimes	Usually	Always
S1	2.56%	12.82%	17.95%	43.59%	23.08%
S2	5.13%	7.69%	25.64%	41.03%	20.51%
S3	2.56%	12.82%	23.08%	28.21%	33.33%
S4	5.13%	7.69%	33.33%	25.64%	28.21%
S5	0%	5.13%	23.08%	43.59%	28.21%
S6	2.56%	2.56%	30.77%	30.77%	33.33%
S7	2.56%	10.26%	48.72%	20.51%	17.95%
S8	5.13%	10.26%	41.03%	17.95%	25.64%
S9	5.13%	7.69%	25.64%	35.9%	25.64%
S10	2.56%	7.69%	23.08%	30.77%	35.9%
S11	5.13%	17.95%	35.9%	20.51%	20.51%
S12	7.69%	7.69%	17.95%	28.21%	38.46%
S13	2.56%	7.69%	23.08%	35.9%	30.77%
S14	5.13%	5.13%	17.95%	33.33%	38.46%
S15	7.69%	7.69%	30.77%	23.08%	30.77%
S16	5.13%	2.56%	28.21%	30.77%	33.33%
S17	2.56%	5.13%	20.51%	35.9%	35.9%
S18	5.13%	7.69%	41.03%	15.38%	30.77%
S19	12.82%	7.69%	28.21%	28.21%	23.08%
S20	10.26%	17.95%	30.77%	20.51%	20.51%
S21	2.56%	10.26%	25.64%	38.46%	23.08%
S22	7.69%	15.38%	15.38%	46.15%	15.38%
S23	10.26%	7.69%	38.46%	28.21%	15.38%
S24	10.26%	17.95%	23.08%	33.33%	15.38%

Thirdly, from Table 3, in all strategies, only S5(practice pronunciation) appeared the situation that no students never practice pronunciation, and the use frequency of this strategy is higher than most of strategies. Actually, this is because English is a language, we need know how to pronounce the words and it would be helpful to remember them. S24(understand culture) mainly examine their intercultural communication awareness and competence. This strategy carries the lowest using frequency, in which 28.21% students never or seldom use this strategy and no more half students usually or always use it. It's the same as S20(share learning experiences with others).

### 5.2 Correlation Analysis of Strategy Use and Performance

**Table 4.** Regression Analysis Results of English Achievement and English Learning Strategies

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson	Sig.
1	.903	.816	.500	1.012	1.912	0.034

a. Predictors: (Constant), S24, S6, S3, S19, S10, S5, S21, S8, S20, S7, S2, S14, S18, S9, S23, S4, S16, S22, S1, S17, S12, S11, S13, S15.

b. Dependent Variable: Score Range

In order to test the correlation between English learning strategies and English achievement, a multiple regression analysis of English achievement and 24 strategies was carried out. As can be seen from Table 4, the 24 strategies are significantly positively correlated with English performance (sig value is 0.34, less than 0.05).  $R=0.903$ , that is, the 24 learning strategies have 90.3% predictability on test scores. It shows that students with higher achievement have higher levels of using English learning strategies, which is consistent with teaching experience. Taking the strategy of “attention to mistakes” as an example, as shown in Figure 1, students in the 120-134 points and students in the 105-119 points have the largest proportions of “Usually” and “Always”.



**Figure 1.** Bar Chart of Histogram of Score Range vs. Strategy Usage

### 5.3 Analysis of the Causes that Affect the Choice and Use of English Learning Strategies

Take S3 “using phonology to memorize new words” and S7 “English dialogue” as examples. As regards S3, many students interviewed said that they rarely have the opportunity to have real English conversations, and they are afraid to communicate in English. Teachers said that there will be situational dialogues in the classroom, which may make them less willing to speak English due to the limitation of knowledge level. About S7, it examines the mastery and utilization of the pronunciation regularity of the letter combination among junior high school students. Some students said that he could not even read new words accurately, and if he spells them according to the pronunciation, he might make more mistakes. Therefore, he rarely used rhythm to memorize new words. The teacher replied that she had taught students to memorize words in this way, but they still remembered the words in the original way, probably because they didn’t have a lot of time to practice.

In general, the causes can be analyzed from the two levels of students and teachers. From the perspective of students, first, they did not realize the importance of using learning strategies in the process of English learning. Second, they lacked the methods of using learning strategies. Third, they did not develop good habits to use learning strategies in the process of English learning, since these strategies are a bit complicated for them to use. According to the cognitive load theory, the amount of cognitive load they need is beyond what they actually have. As for teachers, first, there was a lack of relevant knowledge of English learning strategies. Some teachers themselves don’t know what learning strategies are and how to choose the correct ones and use them. Second, the training of English learning strategies for students was neglected. Only the explanation of English learning strategies is not enough, the continual training after studying new strategies is quite significant. During the class, teachers are supposed to give students opportunities to practice as much as possible.

### 5.4 A Brief Summary

In a word, students in C junior high school generally have a strong awareness of using English learning strategies of top students, which is positively correlated with their English scores. It shows that it is necessary to use English learning strategies effectively. Not just top students, but most students have the awareness of using English learning strategies, but it is at the low level of using frequency and effect. Combined with the interviews of students and teachers, the causes can be divided into two perspectives. On the one hand, consciously, students cannot correctly

understand the value of a certain English learning strategy. This is one factor that they are unwilling to use the learning strategy which isn't very helpful for them. On the other hand, behaviorally, unskilled operation lead to declining frequency of using learning strategies. More specifically, there is no enough practice when they are learning English, lacking of proficiency.

In terms of the use of English learning strategies, teachers are the key factors affecting students' level of using English learning strategies. Although the teacher in this study had the awareness and teaching behaviors to cultivate students' use of English learning strategies, she lacked many effective exercises in class. Only with repeated practice can students automate their application of English learning strategies. And from the perspective of cognitive load, students' English learning will become easier.

Therefore, to enhance the frequency and effect of English learning strategies, teachers are supposed to provide students more opportunities and guidance to practice and use English learning strategies in class, rather than ask them to apply these strategies by themselves after class.

## **6. The Cultivation of Students' English Learning Strategies from the Perspective of Cognitive Load**

In order not to make English learning strategies become an extra burden for students, but a good way to learn easily and efficiently, it is necessary to control the cognitive load of students in the learning process, to be more specific, the amount of internal cognitive load, external cognitive load and germane cognitive load. According to the sources, properties and interrelationships of the three types of cognitive load, we can decompose this task into three aspects: reducing the intrinsic cognitive load, reducing the external cognitive load, and moderately increasing the germane cognitive load. Teachers can use the following methods to increase students' initiative in using learning strategies.

### *6.1 Strategies to Decrease Intrinsic Cognitive Load*

The internal cognitive load is related to the characteristics of teaching materials and students' cognitive level. There are several ways to help students decrease their internal cognitive load.

#### **6.1.1 Reducing Elements**

There are many elements in a complex task or learning content, and if you want to simplify the learning material, you need to reduce the number of elements. At this time, although the total amount of information to be processed does not decrease, the cognitive load also decreases due to the decrease in the number of processing units. The following are some examples that can be emphasized while teaching: First, when memorizing words, teachers can cultivate students' awareness and habit of classifying. When teaching new words, you can ask students which words are verbs, nouns and so on, from time to time. When talking about the diet, teachers could ask students which words are related to vegetables, which words are related to fruits, and so on. In this way, students would form the habit of classifying before remember vocabularies. Second, when memorizing texts with large sentences, one of the skills is to circle key words and memorize key points. Third, in the case of a lot of knowledge points, in order to avoid omission, connecting the first or representative word of each meaning unit in series is a good way, so that students can remember a big aggregation through this small compound unit. This is more common in grammar teaching.

#### **6.1.2 Linking Old and New Knowledge**

Since another factor that affects the intrinsic cognitive load is students' prior knowledge, the students' prior knowledge must be taken into account to reduce the intrinsic cognitive load of students. The first is if students have mastered part of the relevant knowledge when learning the task, this part of the previous knowledge provides important support for students to learn new knowledge. All the teacher has to do is activate students' schema. In English class, teachers can often ask "Do you remember what we have learned is related to or similar to this?" so as to strengthen students' awareness and habit of extracting information related to it. On the contrary, if the student knows nothing about the new knowledge, what the teacher need do is to help the student construct the schema, namely, to provide relevant background knowledge.

### *6.2 Strategies to Decrease External Cognitive Load*

The external cognitive load is related to the presentation of teaching materials and the level of instructional design. The increase of external cognitive load is mainly caused by improper teaching organization and presentation of teachers. Therefore, in order to better control external cognitive load, the following teaching strategies can be taken.

#### **6.2.1 Setting Goals**

There are mainly two advantages in cultivating students' awareness of making plans. First of all, students need

clarify learning objectives for students before teaching, whose main purpose is to focus students' attention. When there is external interference, students' learning status is generally not good, so it is very important to have a clear goal. Besides, when the goal is set, it is clear what they want to do and what purpose they want to achieve. It helps to choose English learning strategies and avoid the interference of other irrelevant strategies.

### 6.2.2 Reducing Redundancy

Steps or ways that are not necessary are redundant to students' learning and cause unnecessary cognitive load. For example, when a student encounters a new word when reading an article, not all words need to be looked up in the dictionary, and some words can be inferred based on the logical relation of the context and the context. At this time, the step of looking up the dictionary is to redundant and can lead to bad reading habits. From a multi-channel perspective, on the one hand, when the same information is presented in multiple ways at the same time, students will process redundant information at the same time, resulting in the increase of external cognitive load and the reduction of learning quality. On the other hand, a single channel is overloaded and the other channels are idle. For example, when memorizing words and texts, just reading silently, without reading and writing accompanying, will increase the external cognitive load.

### 6.3 Strategies to Increase Germane Cognitive Load

According to the cognitive load theory, relevant cognitive load refers to the use of unspent remaining cognitive load resources in the process of completing a task to direct processing related to learning, which can promote students' learning. But at the same time, it is restricted by internal cognitive load and external cognitive load. When the internal cognitive load and external cognitive load are large, and the total amount of cognitive resources is unchanged, then the relevant cognitive load is naturally less. (Pang, 2011) Therefore, in the learning process, internal and external cognitive loads should be reduced as much as possible, and related cognitive loads should be increased.

#### 6.3.1 Stimulating Learning Motivation

Learning motivation influences the process of cognitive construction through the arousal of learning emotional state, the enhancement of learning readiness, the concentration of learning attention and the enhancement of learning will. Like a catalyst, learning motivation indirectly enhances and promotes the process of cognitive construction. Teachers can stimulate students' learning motivation in the process of English teaching from the three aspects. First, varied teaching methods arouse students' enthusiasm for learning. Second, the novel teaching content attracts students' attention. Third, timely teaching evaluation stimulates students' learning enthusiasm.

#### 6.3.2 Multi-modal Assistance

Choose the appropriate mode to assist to learn according to individual's own cognitive style. Different students have different learning styles, some are visual, others are auditory, and others are tactile. For example, most commonly, when memorizing words, listening, speaking, reading and writing can be performed simultaneously. By imagining scenes, memorizing pictures, and using phonology, understanding and assist memory could be deepened.

## 7. Conclusion

Studies on learning strategies started early, which are rich and in-depth, and have proved that the use of English learning strategies can effectively improve students' English learning performance. However, in many studies, the effectiveness of the use of English learning strategies is not much. In terms of research objects, middle school students are less than college students, and middle school is the critical period to lay a solid foundation. Therefore, this creates an opportunity for this study. This paper investigates the use of English learning strategies in junior high school, aiming to find out the problems and causes in the teaching of English learning strategies, so that teachers can clearly understand the situation and characteristics of junior high school students' English learning strategies. Then, based on the cognitive load theory, this paper analyzes the cognitive load of students when using learning strategies, and proposes some measures to optimize the teaching of English learning strategies. These measures are convenient for teachers to adjust their teaching strategies and teaching methods, so that students can learn effectively not only in class, but also in the extracurricular effective learning, reduce students' learning burden, improve learning efficiency.

Through the analysis of questionnaire statistics and interview results, this paper summarizes the current situation of the application of English learning strategies among senior three students, demonstrates the relationship between the application of strategies and students' English scores as well as the relationship between excellent and poor students. At the same time, it makes a brief statistical analysis of the factors affecting the application of English learning strategies among students in Grade 9, C junior high school, and finds that effective use of learning strategies in

English learning contributes to excellent students to improve their English learning.

The frequency of students using English learning strategies is not high, mainly due to the neglect of the value of learning strategies and insufficient practice, beyond their cognitive load. In order not to make the use of English learning strategies become an extra burden for students, but a good way to learn easily and efficiently, it is necessary for teachers to subtly and repeatedly give students opportunities to use English learning strategies in class. Then, when teachers cultivate students' awareness and habits of English learning strategies, the following teaching can be used. First, decrease internal cognitive load: reducing elements and linking old and new knowledge. Second, decrease external cognitive load: setting goals and reducing redundancy. increase germane cognitive load: stimulating learning motivation and multi-modal training.

It should be noted that it is not always necessary to use English learning strategies. In addition, frequent use of unnecessary English learning strategies will make students have more burdens. Improving the effectiveness of English learning strategies is the key. Teachers need to tell students when they need to use English learning strategies, instead of always thinking about which learning strategies to use. That is to say, if the situation is relatively simple, then there is no need to use learning strategies, and when the learner thinks that students' task is more difficult or takes a long time, then they can consider using English learning strategies at this time. Starting from the perspective of cognitive load, the first step, theoretically, the total amount of cognition should be within the student's tolerance range. In practice, if students feel that a learning task is difficult, they need to reduce the internal cognitive capacity through judgment. Whether the cognitive load is to decrease the external cognitive load, or to increase germane cognitive load, choose the most convenient strategy.

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