Curriculum and Teaching Methodology (2025)
Clausius Scientific Press, Canada

DOI: 10.23977/curtm.2025.080804
ISSN 2616-2261 Vol. 8 Num. 8

Research on the Translation and Teaching of English Idioms from the Perspective of Ecology Based on Cultural Differences

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Keywords: Cultural Difference, Ecological Horizon, English Idioms, Particle Swarm Optimization Algorithm, English Teaching Mode

Abstract: This paper proposes a research method of English idiom teaching from the ecological perspective based on cultural differences, aiming to study the translation and teaching of English idioms. The method proposed in this paper is to use the particle swarm optimization algorithm based on ecology to teach English idioms. Using this algorithm to track and collect English idiom teaching information greatly improves the teaching efficiency in English idiom teaching. The results of the teaching questionnaire were analyzed by SPSS (26.0), and the P values of each item in this questionnaire were all above 0.05. This proves that the English idiom teaching model based on ecology can effectively improve students' academic performance. The experimental results can effectively show that the research on the teaching mode of English idioms based on ecology is feasible. The results of this study clearly show that the ecological technology can be well applied to the current English idiom teaching, which provides a possible development direction for the future English idiom teaching mode.

1. Introduction

As the essence of a language, idioms are a very important content in the development of national culture. For English idioms, learning English idioms can promote the rapid progress of students' language application level, and has an irreplaceable role in English learning. English idiom teaching not only improves the quality of students' learning, but also plays a vital role in promoting the upgrading of the entire English teaching method. In addition, it also promotes the development of the education industry. At present, China has made a lot of achievements in the research of English idiom translation and teaching related topics, and can effectively face the current English idiom translation and teaching problems. But with the rapid development of electronic information technology, facing the current complex network electronic information environment, the traditional idiom translation and teaching methods in the past naturally showed many problems. Therefore, it is urgent to use the current high-tech ecological technology to study the problems of English idiom translation and teaching from the perspective of cultural differences in various countries, new idiom translation and teaching path. However, the research on the translation and teaching of English

idioms from the perspective of ecology is still in its infancy.

Since the rise of modern society, with the rapid development of network technology, many scholars at home and abroad have focused on the research of english idiom translation and teaching methods. chen l. Pointed out that idioms are the essence of language, rich in cultural connotations and ethnic characteristics. Due to linguistic and cultural differences, most English idioms lack equivalent expressions in Chinese, making translation challenging. Common strategies in English-Chinese translation include literal translation, free translation, and paraphrasing. Eugene A. Nida's paraphrasing method is a crucial strategy for translating idioms. Reasonable application of multiple strategies can preserve the original idiom's flavor while meeting the needs of Chinese readers. Exploring the application value of paraphrasing can inject new vitality into research [1]. Vasiljevic Z. believes that idioms often pose comprehension difficulties for second language learners due to their obscure meanings and non-systematic vocabulary selection. However, cognitive linguistics indicates that idiomatic expressions have semantic motivation and can be regarded as conceptual metaphors. Their research found that conceptual grouping enhances idiom comprehension, and introducing basic concepts in the native language facilitates student acquisition [2]. Hua X. explored the relationship between Chinese learners' familiarity and transparency in understanding English idioms. The results showed that familiarity positively correlates with conventional knowledge but has no significant association with transparency. Learners find idioms with high familiarity and transparency easier to understand, where contextual influence and significant interaction effects with familiarity are observed, providing insights for teaching [3]. Baghana-Tatiana J. Emphasized the diversity of modern English idioms and highlighted their importance in assessing text semantic load and political orientation. Based on analysis of Anglo-American political texts, she examined the use of idioms in political discourse and the significance of linguistic-cultural cooperation in interpretation [4]. These achievements study the teaching of English idioms from multiple dimensions, but they do not put their translation and teaching into an ecological perspective, which is not conducive to the further research.

In the era of rapid technological advancement, studying English idiom teaching through ecological algorithms has emerged as a highly innovative approach. Many scholars have already explored ecological technology. Bitokova SK investigates idiom learning from an ecological perspective, revealing underlying motivational foundations through etymological analysis and implementing creative exercise training. This methodology not only deciphers the formation mechanisms of idiom meanings but also significantly enhances idiom acquisition and memory retention, providing students with deep cultural cognition for English proficiency development [5]. Biljetina JL analyzes English and Serbian idioms from dual perspectives of cognitive linguistics and ecology. After conceptual classification and comparative analysis, she discovered substantial differences in lexicalization patterns between the two languages, yet remarkable conceptual overlaps, concluding shared mechanisms in constructing world cognition systems [6]. Pasechnik TB examines the influence of phrase imagery on English idiom meaning formation. Her research, grounded in various ecological perspectives, focuses on English phrase units with fully or partially transferred meanings, highlighting how their semantic attributes are shaped by linguistic, cultural, and ecological variations [7]. Destaria M investigates English idiom translation across different ecological environments, noting the challenges in accurately capturing idiom meanings and finding Indonesian equivalents. She proposes translation strategies to address these issues [8]. While these expert studies demonstrate comprehensiveness, they remain superficial, lacking deeper exploration. Most exhibit strong theoretical frameworks but lack practical applicability and reliability in real-world research.

At present, there are many problems in the traditional English idiom translation and teaching methods, such as: when the idiom is translated, the words are not expressive, and the sentences in

the idiom translation are not smooth. In addition, in English teaching, students always passively accept teaching knowledge, have little interest in learning idioms, and are not proficient in the use of skills such as addition, subtraction, and translation. In today's rapid development, English idiom teaching methods also need to be in line with the latest cutting-edge technology. Compared with the traditional English idiom teaching method, the use of ecological technology is combined with the traditional English idiom teaching method. Many problems that existed in the past can be solved. The English idiom teaching process can be implemented more quickly, and the relevant English idiom knowledge can be taught to the greatest extent on the premise of ensuring the students' interest in learning.

2. Research background and significance of English idiom teaching

2.1. The concept of English idioms

Idioms are the essence of language cohesion and have unique language functions: rich rhetorical devices and diverse forms. The phonology of the idioms is harmonious, the reading is catchy, and the structure is beautiful, giving people a beautiful artistic enjoyment. Learning English idioms can enable learners to form a rich imagination space, which is conducive to the learning of English application. In addition, English idioms also contain a wealth of Western cultural information. English idioms are philosophical and beautiful in form. They embody the life experience of Westerners to inspire and teach people. English idioms have broad meanings in a broad sense. In addition, the more knowledge of everyday English language learners have, the more helpful they will be in recognizing English idioms. Idioms are gradually formed in the history of language and culture development. Due to the specificity of idioms, idioms cannot be decomposed or reorganized.

2.2. Research on the translation of English idioms

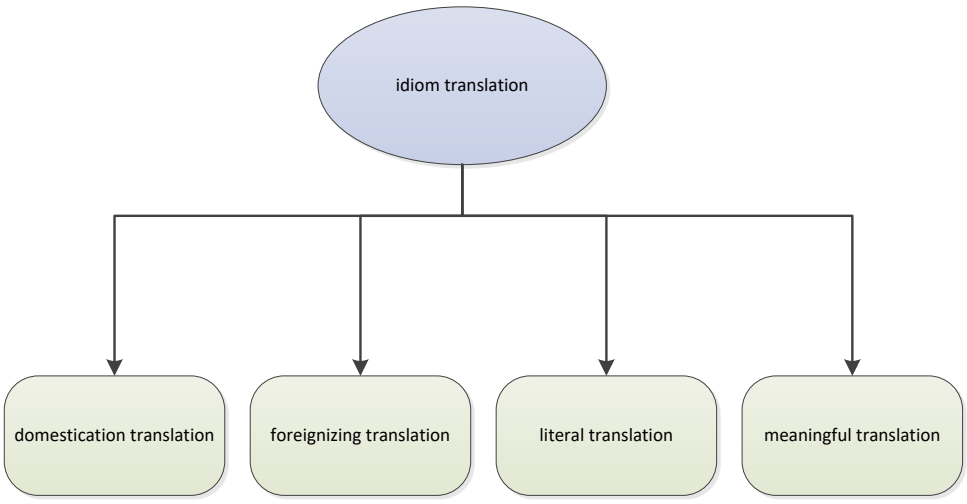

Figure 1 Diagram of how English idioms are translated

Translation is the process of mutual conversion between different languages. Its task is to first accurately understand the ideas in the original language, and then select appropriate words to express them in the target language. It is particularly important in translation work to deal with the problem of translation between English and Chinese from the perspective of language through language comparison. Only by comparing two languages and cultures can the translation be

guaranteed to be equivalent to the original.

Language translation methods are roughly divided into domestication and foreignization [9]. Domestication translation refers to the transformation of foreign elements from one culture into familiar content from another culture. Ignore the imaginary meaning of the source text, pay attention to the pragmatic meaning, and choose the target language expression that has the same pragmatic meaning as the original text. Naturalization gives readers a certain understanding of the wonders of other cultures at the expense of many cultural ideas, but at the same time loses the opportunity to understand and understand foreign cultures. The foreignization translation means that the foreign language of the original text and the deep feelings of the author at the time of writing should be preserved, and the wording and writing habits of the original author should be respected. Among them, the way of translation of English idioms is shown in Figure 1.

2.3. Research on the teaching of English idioms

English idioms are an important part of English vocabulary. Idioms are common in everyday life and are mainly used in spoken and written language. Idioms occupy an important position in English, and the level of idioms is an important indicator to measure the language level of learners. Therefore, it is very necessary for English learners to learn and understand idioms. English learners' knowledge of English idioms helps them master the real language of native English speakers. In the teaching of English idioms, many researchers have put forward a series of suggestions on the selection of idioms, the practice of idioms, and the use of idioms.

In idiom teaching, it is necessary to help students establish a cognitive system of english idioms as much as possible, so that they can truly understand and master the nature and usage of english idioms. In addition, teachers should consciously pay attention to the cultural connotation contained in idioms, and impart idiom knowledge to students subtly. Moreover, teachers should also pay attention to the practical application of idioms, cultivate students' oral communication ability, and help students to cope with various English communication situations calmly. English teaching should create a learning environment as much as possible so that students can contact and use English idioms and broaden their language knowledge of English idioms. In order to effectively prevent the negative transmission of the mother tongue, it is necessary to compare the language and culture of the mother tongue and the target language. When learners first learn English, they often don't realize that idioms are inseparable, and as their English proficiency improves, they tend to use idioms as a whole. Context plays a very important role in idiom processing. Idiom semantics and context matching are important directions for determining idiom recognition. Students' strategies for understanding idioms are mainly context-dependent.

3. Development of ecology and analysis of algorithms

3.1. Development of educational ecology

Educational ecology is a new educational method that combines ecological technology and educational theory in pedagogy. It relies on ecological technologies, including principles such as ecological balance and collaborative learning. Educational ecology mainly studies the response law between education and ecological environment. We also study various educational methods and educational issues, and point out the development of educational methods from the perspective of natural ecology. Educational ecology plays a leading role in educational research and practice. This paper analyzes the shortcomings of English idiom translation teaching from the perspective of educational ecology, and points out the new development direction of English idiom translation teaching. Educational research should take a long-term perspective. Combining educational ecology

with English idiom translation teaching can promote the progress of English teaching with the help of ecological technology.

3.2. Research on particle swarm optimization algorithm

Particle swarm optimization algorithm is a typical swarm intelligence optimization algorithm. Particle swarm optimization is similar to genetic algorithm, and it also relies on competition among individuals and the survival of the fittest to achieve the ability of the entire group to seek optimization. In contrast, the particle swarm optimization algorithm does not use genetic algorithm coding, crossover, mutation and other operations, but uses a relatively simple velocity and position model, which makes the structure of the algorithm relatively simple. Therefore, compared to the genetic algorithm, the particle swarm algorithm is easier to implement.

3.3. The original particle swarm algorithm

In the original particle swarm optimization algorithm, a group of m particles passes through a D-dimensional space. Here each particle represents a potential solution. Particles fly through space, and their flight characteristics are determined by their velocity v and their position x. This position is called the individual best point pbest, and the entire particle swarm records the best position experienced by the entire population. We call this position the group best point gbest. The algorithm is developed according to the individual and group optima of each particle. The evolution formula is :

$$v_{i,d}[k+1] = v_{i,d}[k] + c_1 r_1 \left(\text{pbest}_{i,d} - x_i[k]\right) + c_2 r_2 \left(\text{gbest}_d - x_i[k]\right) (1)$$

$$x_{i,d}[k+1] = x_{i,d}[k] + v_{i,d}[k+1] (2)$$

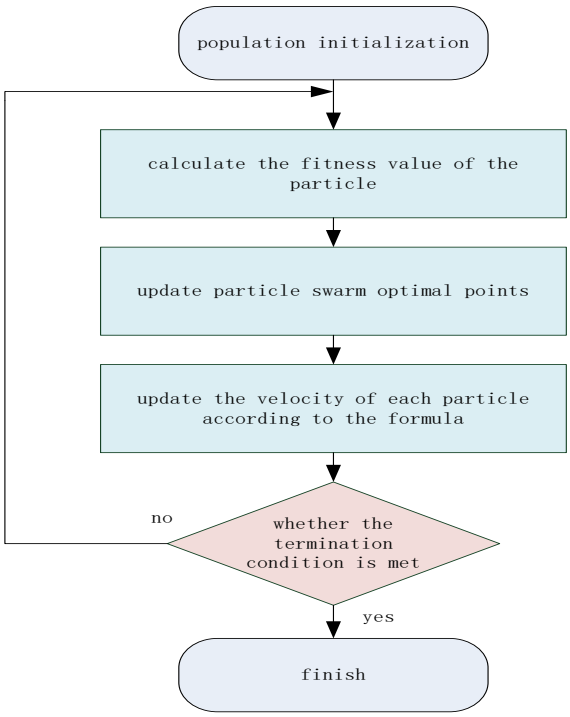

Figure 2 Flow chart of particle swarm algorithm

Among them, $x_{i,d}$represents the position of the i-th particle in the k-th generation in the d

dimension, $v_{i,d}$represents the d-dimensional velocity of the i-th particle in the k-th generation, and the range and distance of the particle satisfy i∈[1,2,... N] and d, respectively ∈[1, 2,...,D]. Also, $r_1$sum $r_2$is a random number uniformly distributed between 0 and 1. $c_1$and $c_2$is a constant called the acceleration factor. The particle swarm algorithm requires that the particles do not have too high velocity to improve the convergence of the algorithm. Usually set the upper limit speed V_{max}. If the particle velocity is greater than V_{max}, the maximum velocity is V_{max}. Typically, it will be V_{max}set between 0.1 and 0.5 times the entire search range. The flow chart of the particle swarm algorithm is shown in Figure 2.

3.4. Particle Swarm Optimization Algorithm

In the original particle swarm algorithm speed iteration formula, the current speed of the particle has a certain influence on the particle's next movement trend. This item can be understood as the particle has a certain motion inertia, and this inertia will make the particle have a certain expansion space. Instead of flying directly to the area where the optimal point is located after obtaining the individual optimal point and the global optimal point. In order to better adjust and balance the exploration ability of particle swarm optimization, there is a particle swarm optimization algorithm with inertia weight, which introduces inertia weight based on the original iterative formula. The formula is as follows:

$$v_{i,d}[k+1] = wv_{i,d}[k] + c_1 r_1 \left(\text{pbest}_{i,d} - x_i[k]\right) + c_2 r_2 \left(\text{gbest}_d - x_i[k]\right) \tag{3}$$

Obviously, the inertia weight w can adjust the motion inertia of particles. When the value of w is relatively large, the algorithm has better global search ability and weaker local search ability; on the contrary, when the value of w is relatively small, the algorithm has better exploration ability At this time, the algorithm has better local search ability.

The adjustment formula of inertia weight w is:

$$w = w_{\max} - \left(w_{\max} - w_{\min}\right)\frac{t}{T} \tag{4}$$

Where t is the number of computations of the current function, that is, the number of times the fitness function is called during the entire iteration. $w_{max}$and $w_{min}$are the initial and final inertia weight values, respectively, and T is a linearly decreasing inertia weight run. Experiments show that this linearly decreasing inertia weighting scheme improves the search performance of particle swarm optimization.

On the other hand, in order to ensure the convergence of particle swarm optimization, the parameters of particle swarm optimization were analyzed, and a particle swarm optimization with increased shrinkage factor was proposed. The rate iteration equation for particle swarm optimization with shrinkage factor is:

$$v_{i,d}[k+1] = \chi\left[v_{i,d}[k] + c_1 r_1 \left(\text{pbest}_{i,d} - x_i[k]\right) + c_2 r_2 \left(\text{gbest}_d - x_i[k]\right)\right] \tag{5}$$

$$\chi = \frac{2}{\left|2 - \varphi - \sqrt{\varphi^2 - 4\varphi}\right|} \tag{6}$$

Where the parameter is full $\varphi = c_1 + c_2,\ \varphi > 4$.

It can be seen from the equation that the shrinkage method is equivalent to the inertial weighted particle swarm algorithm. The analysis shows that by using the reduction factor method, the

optimization ability of the algorithm can be improved without limiting the maximum speed.

In order to ensure that the algorithm has the ability to seek optimization, it needs to ensure its ability to converge. At present, many scholars at home and abroad are analyzing and studying the convergence of particle swarm optimization. For a single particle, the particle swarm algorithm formula is:

$$v_{i,d}[k+1] = v_{i,d}[k] + c_1 r_1 \left(\text{pbest}_{i,d} - x_i[k]\right) + c_2 r_2 \left(\text{gbest}_d - x_i[k]\right) \tag{7}$$

$$x_{i,d}[k+1] = x_{i,d}[k] + v_{i,d}[k+1] \tag{8}$$

4. Realization and testing of English idiom teaching

4.1. English idiom teaching experiment

The research object of this teaching experiment is all students in Class 5 and Class 6 of a senior middle school in a certain city. The two classes are taught by the same English teacher, and the content of the classroom teaching is exactly the same. The students' English idiom learning level is similar. The age range of the students is 17-18 years old, and the same English teaching materials are used. The control class is class 5, using the current traditional English idiom teaching method; the experimental class is class 6, using the teaching method of English idioms based on educational ecology. The sample size is 40, and both classes have 20 students.

Questionnaires were distributed to the students of the two classes to understand the English idiom learning situation of the two classes. First, the comparison of English idiom learning of the students in the two classes is shown in Table 1.

Table 1 Comparison of English idiom learning of students in two classes

question	control class	experimental class	$\chi 2$	P
vocabulary	5	5	5.221	0.127
grammar	3	4	5.145	0.122
pronounce	5	5	4.685	0.102
hearing	5	6	4.544	0.122
read	7	5	5.137	0.107

The following results were obtained by analyzing the questionnaire results through SPSS (26.0). It can be seen from Table 1 that the P value of each item in this questionnaire is above 0.05. This indicated that there were no significant differences between these items. This side shows that there is no significant difference between the two classes in learning English idioms before the classroom experiment. This shows that students' attitude towards English idioms is very positive, and students can deeply realize the important position of idioms in learning English.

4.2. Analysis of English test results in two classes

After three months of teaching using different methods, two classes are tested for English performance, and the effect of the English idiom teaching mode will be analyzed according to the test scores. In order to see the results more clearly and analyze, this paper made a comparison chart of the English test scores of the two classes. Figure 3 shows the statistics of the English test.

Can be seen from Figure 3 that after three months, the English scores of the experimental class are better than those of the control class. By continuing to calculate the sum of the scores of the two classes, it can be seen that the average English score of the control class is 69.6, while the average English score of the experimental class is 71.7. And through the calculation, the average score of

the experimental class is 2.1 points higher than that of the control board. However, a comparison of grades does not indicate that the English idiom education model of ecological pedagogy is better, and multiple experiments are needed, and the English grades of the two classes will be tested after three months of continuous teaching. Figure 4 shows the statistics of the second test.

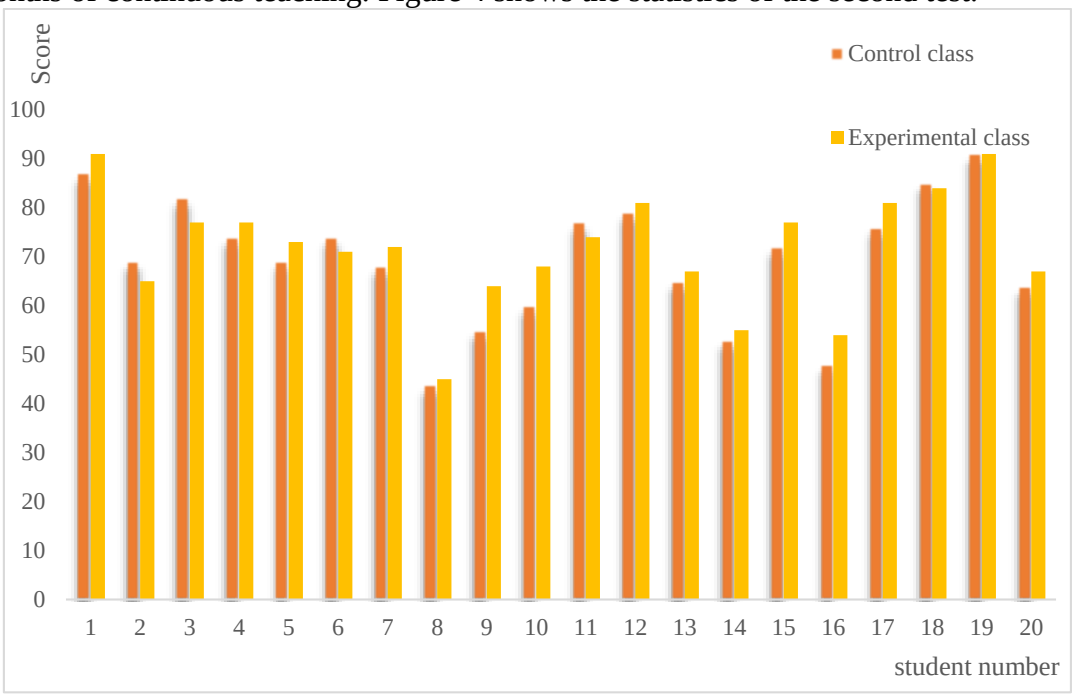

Figure 3 Statistical graph of the first English test scores

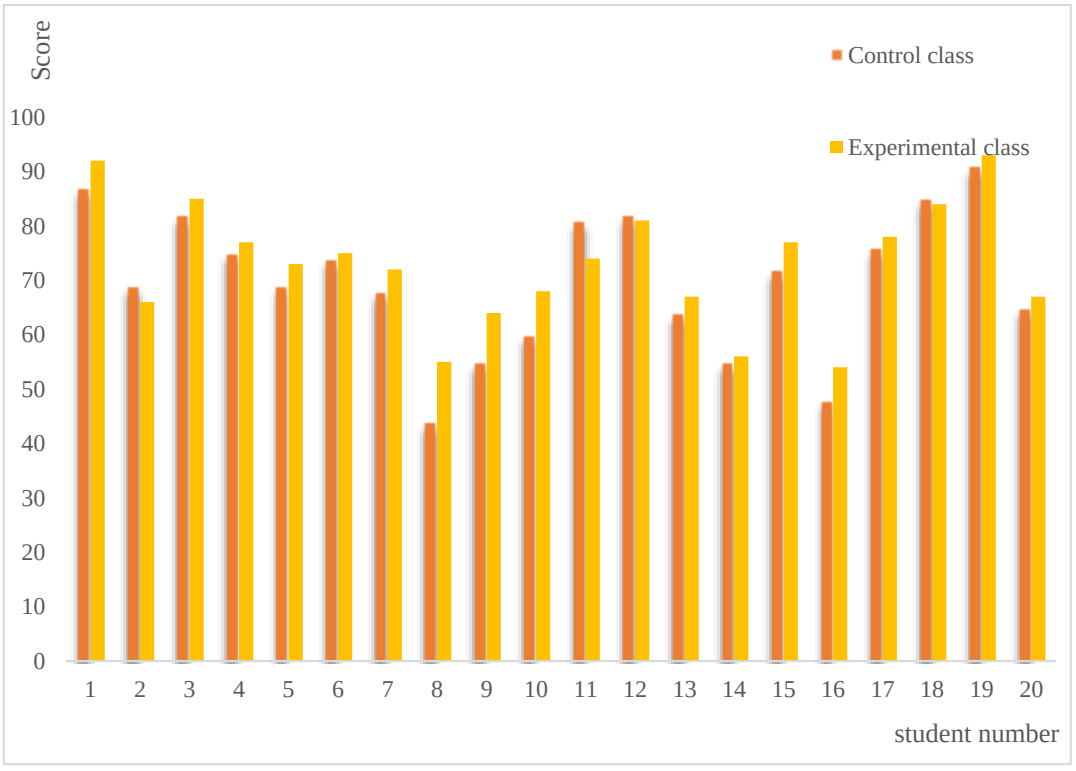

Figure 4 Statistical chart of the results of the second English test

From Figure 4 that the second grade of the two classes is basically better than the first grade.

Using the same method to calculate, the average English grade of the control class is 70.1, while the average English grade of the experimental class is 72.9. And through calculation, the average score of the experimental class is 2.8 points higher than that of the control board. The improvement in the average score of English is higher than the previous time. From the results of these two experiments, to a certain extent, it can be shown that the English idiom teaching mode of ecological pedagogy is more helpful for the commission of English scores.

Based on the results of this experiment, it is confirmed that the use of ecology-based English teaching mode in English teaching does improve students' English idiom scores. This new English idiom teaching method is feasible and effective.

5. Conclusions

The intelligent English idiom teaching method based on ecological technology not only improves the ability of English idiom teaching, but also improves students' learning enthusiasm, and has a significant effect in English idiom translation and teaching experiments. This study believes that after using the method of teaching English idioms based on ecological pedagogy, the learning atmosphere of the whole class has undergone more obvious changes, the students' enthusiasm for learning is more enthusiastic, and the learning efficiency of English idioms is also greatly improved. This teaching method of English idioms improves students' enthusiasm for learning English idioms by providing good teaching guidance, allowing students to transform from traditional passive learning methods to current active learning methods. However, although the English idiom teaching method based on ecology can effectively improve the stability and efficiency of the English idiom teaching process, this system has a disadvantage, that is, it needs strong processing ability to deal with complex learning information and analyze various learning information in the teaching process. Therefore, in order to support the operation of this English idiom teaching method, a powerful processor is required. Therefore, this system is not suitable for schools with poor processors, which is the shortcoming of the intelligent English idiom teaching method. The advantages of this English idiom teaching model in terms of efficiency, stability and immediacy far exceed those of the traditional English idiom teaching method. Used by some schools. For users, the internal processor, as the brain for processing teaching information, plays a vital role in the whole English idiom teaching. If the hardware conditions are difficult to guarantee. Then this English idiom teaching method will be difficult to ensure smooth operation. But I believe that with the progress of society and the development of science and technology. In the near future, the hardware side will no longer be the shackles of technology. Therefore, in the future, the traditional English idiom teaching method will be combined with ecological technology to realize a hybrid intelligent English idiom teaching method, which will further advance the English idiom teaching method and drive the development of English idiom teaching with ecological information.

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