



Research on the System Design of Cooperative Foreign Language Teaching Mode Under Data Analysis

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Abstract. With the development of English education, the requirement of College Students' English ability is higher and higher. However, the lagging teaching mode restricts the learning of College English writing. As a new learning mode, the cooperative foreign language teaching mode combined with ant colony algorithm is of great significance in the study of College English writing teaching.

Keywords: Ant colony algorithm · Collaborative · Foreign language teaching mode

1 Introduction

College English writing is a key link in College English education, especially in the current social environment of questioning the writing ability of college students, College English writing has become the most difficult link faced by English educators and all college students. As we all know, English writing is a collection of English knowledge. Through the reasonable collocation and application of vocabulary, sentence patterns and grammar, the final English article is formed, which reflects students' English knowledge, English thinking ability and comprehensive ability of English application, and becomes an important development orientation of English learning. In the traditional English teaching classroom, teachers instill knowledge points into Yu students through one to many teaching mode, which can not cultivate students' comprehensive ability according to their knowledge level and interest.

2 Ant Colony Algorithm

Ant colony algorithm is an algorithm to solve combinatorial optimization problems based on natural foraging behavior [8 scientific observation shows that ants in nature can always find the shortest path from ant nest to food source, and release substances in the process of searching for food, which is called pheromone. The higher the concentration, the more likely the ants will move in this direction. Therefore, more ants will leave more pheromones on the path, and most of them will eventually go through the optimal

path [1]. The core of ant colony algorithm is mainly based on ant state transition rules and pheromone update rules, but ant colony algorithm has the defects of slow convergence speed and easy to fall into local optimal solution. In order to improve the convergence speed and the accuracy of the mosquito swarm algorithm, the ant state transition rule, heuristic function and pheromone update rule are improved based on the basic ant colony algorithm. The initialization process is shown in Fig. 1.

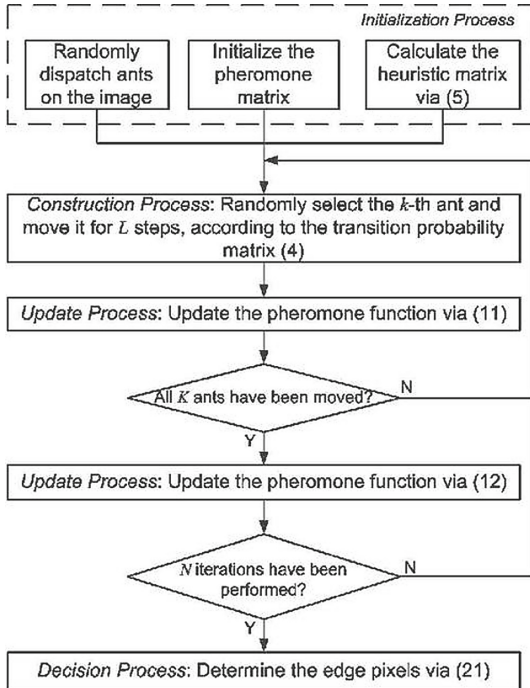


Fig. 1. Inilization process

2.1 Improvement of Ant State Transition Rule and Heuristic Function

The basic ant colony algorithm state transition formula is:

$$S_{uu}^k(t) = \begin{cases} \arg \max\{[\tau_{uv}(t)]^a\} \\ 0, other \end{cases} \quad (1)$$

Where, S_{uu}^k is the opportunity value of the ant with number k to select the next node V at the moment, u (knowledge (1) represents the pheromone concentration, expectation degree and transition probability of the ant from node u to V at the moment, where k is the heuristic function. a is a fixed threshold, $t \in (0, I)$ is a uniformly distributed random variable, allow is the set of all nodes satisfying the constraint conditions, α and β represent

the importance factor of pheromone and heuristic function respectively [2–4]. When the random variable Q is less than the fixed threshold a , a non random search method is adopted by using the known information, that is, the node with the largest product of pheromone and heuristic function is used for state transition; otherwise, the transition probability of all nodes meeting the constraint conditions is calculated, and the state transition is carried out according to the node with high probability.

2.2 Optimized Ant Colony Algorithm

In order to optimize the logical routing problem in PTN network, an optimal path model with multiple constraints is constructed, and an improved ant colony algorithm is used to search the optimal path satisfying the QoS constraints. The optimal path is taken as the optimal solution to solve the logical routing problem. By improving the state transition rule, heuristic function and pheromone update rule in the basic ant colony algorithm, the algorithm gives full play to its strong optimization ability, at the same time, it avoids the “premature stagnation” phenomenon of the algorithm, and speeds up the convergence speed of the algorithm. The experimental results show that the improved algorithm has obvious improvement in operation efficiency and optimization effect [5–7]. In the future, with the increase of the number of networks, the running time complexity will also increase. It is an effective solution to study the idea of partitioning and parallelizing large PTN networks. The simple and easy-to-use ant colony algorithm will play an important role in PTN network planning and optimization. The algorithm provides a certain practical value for the study of network optimal path problem.

3 The Concept of Collaborative Task Orientation

Collaborative is widely used in network teaching, such as collaborative network education. It refers to the teachers in the same field or different fields, the teachers in the same college or different colleges, the teachers in the same country or different countries, using and using the Internet for the same course or the same group of educatees, in the time and content of the education process, highlighting the interaction and connection of network education. In this paper, the collaborative mode takes its literal meaning, which means “cooperation together”, that is, the teaching objects (students) are divided into groups to complete a task together. “Task oriented” originates from “task driven”, which strongly emphasizes the guiding and regulating role of task. When applied in teaching activities, task orientation is to induce, strengthen and maintain learners’ achievement motivation through tasks in teaching activities, and achievement motivation is the dynamic system of learning and completing tasks [8]. Task, as a bridge of learning, is driven by task to achieve the purpose of learning. Specific to this article, “task oriented” refers to the specific teaching content in the teaching plan as a task. Generally speaking, “collaborative task orientation” is to take the specific teaching content of the course as the task, and divide it into several groups according to the number of teaching objects (students). The groups are required to correspond to the task. After careful discussion and study before the group class, it explains some details of the task completion for other students and teachers in the classroom. In this teaching activity, the requirements for teachers

will be more strict. In addition to mastering the basic knowledge of this course, teachers also need to accurately master the knowledge related to this teaching task, because the explanation content of group students can often be expanded beyond the teaching materials.

4 Composition of Collaborative Task Oriented Teaching Mode

The core idea of collaborative task oriented teaching mode is that in the whole teaching activities, teachers and students are in the same position, and teaching tasks are completed by students, including preparation before class and teaching in class. But in the process of students' teaching, the teacher should make a detailed record of the whole teaching activities, so as to comment, supplement and improve after each student's explanation.

4.1 "Collaborative task oriented" team building

Whether the school can cultivate compound talents with professional skills and practical ability, independent working ability and good communication ability, innovative ability and teamwork spirit is the standard team to measure the success of the quality education of the school. It refers to the collective that can complement, unite and share the responsibility and mission [9, 10]. Collaborative task orientation is implemented in the way of team, and the formation of team is the premise of collaborative task orientation. As shown in Fig. 2. The size of the team depends on the total class hours and the total class size. If the number of members in each group is too many, it will be difficult to understand the task. The formation of the team is completed by teachers before class, and students' interests, learning level, learning ability, personality differences and other factors should be considered comprehensively.

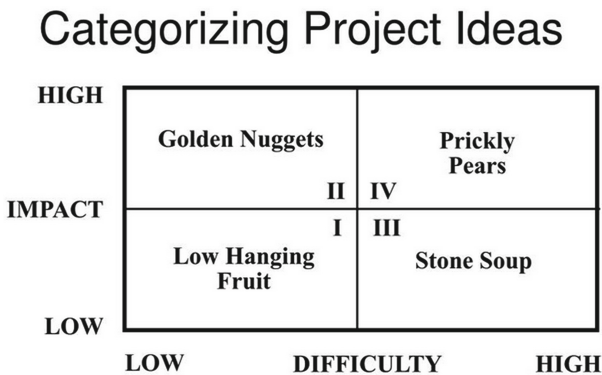


Fig. 2. Collaborative task oriented team building.

4.2 “Collaborative Task Oriented” Task Decomposition

In the higher vocational colleges which pay attention to the cultivation of technical ability, the guidance task often focuses on the skills involved in the professional post and ignores the learning of theoretical knowledge. In application-oriented universities, in addition to technical learning, we also need to master solid theoretical knowledge. Therefore, a specific guidance task can not cover all of a skill or a textbook. Sometimes a task may be a complex theoretical derivation or an example of combining theory with practice [11]. Specifically, the guiding task should be arranged according to the syllabus and teaching plan, and each team should arrange the teaching task that can not be returned. Then, each team member should learn independently, and encourage students to expand the content beyond the teaching materials, that is, to consult the materials and essays related to the guiding task, and the guiding task should be completed by the students of this group. If the class size is small and the total class hours are large, each team can assign different guidance tasks and explain them several times.

4.3 “Collaborative Task Oriented” Evaluation System

The collaborative task oriented teaching evaluation system includes four evaluation criteria. One is scientific, which requires each team member to understand the content accurately and not deviate from the scientific truth. The other is fluency, It emphasizes that all members of each team should use modern teaching methods (multimedia, network, etc.) and traditional teaching methods (blackboard writing) to explain. It requires members to be continuous in the content of explanation and pay attention to the speed and intonation of language expression. Thirdly, interactivity is not only a simple transposition of teachers and students in collaborative task-based teaching activities, We should also pay attention to the interaction between the subject (narrator) and the object, and strive to mobilize every student’s learning enthusiasm. The fourth is standardization [12–14]. After the collaborative Task-oriented Teaching activities, each member is required to make a systematic arrangement of their own tasks, and on this basis, write a scientific paper, and the paper format meets the requirements of the journal.

4.4 “Collaborative Task Oriented” Teachers’ Role

In the collaborative task-based teaching mode, teachers play an important role. In this process, teachers play two important roles. First, the role of “guide” is to skillfully guide the acquisition of knowledge after task decomposition, the collection of data, the requirements of cooperation, the details of explanation and other specific matters, The role of “summarizer” is that teachers need to make a complete summary of the specific issues such as knowledge combing, content improvement, students’ comments, individual questions and so on.

5 The Role of Teachers in Collaborative Task Oriented Teaching Model

5.1 The Role of Teachers in Collaborative Task Oriented Teaching Model

In the traditional teaching mode, teachers are the main body of teaching. Teachers make teaching plans according to the syllabus, and then complete the teaching content step by step according to the teaching plans to achieve the teaching objectives. In the collaborative task oriented teaching mode, teachers are no longer the main body of teaching, but play the role of chief designer [15]. According to the syllabus, the teaching content is divided into guided tasks according to the chapters, the completion time of guided tasks is planned, and then the teaching team is established according to the difficulty of guided tasks. The teaching team can be divided into three groups according to their interest, learning level, learning ability and personality differences.

5.2 The Teacher is the Director of the Team in the Collaborative Task Oriented Teaching Mode

In the collaborative task oriented teaching mode, the teacher is more like a tutor. From students' access to information, collective lesson preparation, explanation of content to classroom explanation of details, the teacher should play the role of a mentor. In addition, after the team members get the task, teachers need to point out the difficulty of the task. One of the characteristics of collaborative Task-oriented Teaching mode is that each team and members have to explain. When a member begins to explain, on the premise of no mistakes. Teachers should not interrupt the explanation at the beginning, so as to maintain the integrity of members' thinking [16–18]. After the member's explanation, make comments. The main points of comment are the accuracy of the content, the grasp of the scope of knowledge, and the voice, posture, writing on the blackboard, sense of rhythm, content proficiency, coherence, language expression, interaction of the members. Teachers' comments can help students understand their own strengths and weaknesses. For example, atihō's comments can also help other team members learn, learn advantages and overcome disadvantages.

6 Practice of Collaborative Task Oriented Teaching Mode

In the practice of collaborative task oriented teaching mode, the author takes “mining system engineering” course as an example to illustrate the application of collaborative task oriented teaching mode.

6.1 Making Guidance Tasks According to the Syllabus

“Mining system engineering” is a professional basic course of mining engineering. Through the study of this course, students can master the basic principles and methods of system engineering and its application in mining industry. The course requires students to master the theory and application of mathematical programming, shortest path problem, network analysis, analytic hierarchy process fuzzy comprehensive evaluation, system reliability, etc. the total class hours of the course is 30. The main details of each chapter are explained by students in class.

6.2 Determine the Number of Team Members According to the Number of Students in the Class

As this course is 30 class hours, the teacher should summarize and perfect it once after each chapter, and the remaining 10 class hours. If the class size is 30, a team of 3 people can be divided into 10 teams to complete the guidance task. If the class size is 60, each team needs to arrange 6 people. Team members are determined according to students' interests, learning level, learning ability, personality differences, etc. 3) based on classroom explanation + lecture + scientific papers as the assessment basis, the same task orientation has reformed the traditional test paper evaluation method, and replaced by classroom explanation + lecture + scientific papers comprehensive evaluation method. The accuracy of the content of classroom explanation, the grasp of the scope of knowledge, and the voice, posture, writing on the blackboard, rhythm, proficiency, coherence, language expression, interactivity and other evaluation indicators of the members account for 50% of the total score, 20% of the lecture notes written by each member, and 30% of the scientific papers. Scientific papers are in the form of oral defense, and each student will participate in the oral defense when submitting their own papers.

6.3 Strengthen the Understanding of Teaching Content by Teachers' Comments, Summary and Thesis Defense

A class of a team is generally arranged to be completed in about 70 min, and the rest of the time is for teachers to comment on each member. It also includes the summary, carding, improvement and expansion of the team's teaching content, so as to make students of other teams have a systematic understanding and mastery of the team's teaching content [19]. At the same time, while affirming the advantages of the explanation group, correct its shortcomings, and provide help and guidance for other team members in the follow-up explanation. In addition, after the conclusion of each chapter, the teacher will give a systematic, difficult and forward-looking lecture on the content of this chapter in combination with the students' explanation, so as to further consolidate the learning achievements. In order to supervise and identify the authenticity, accuracy and innovation of the scientific and technological papers of each member, the scientific and technological papers submitted by each member shall be defended. Since the first experiment of "mining system engineering" course in class 1, mining engineering grade 07, Heilongjiang University of science and technology, the collaborative task oriented teaching mode has been implemented in all classes of mining system engineering grade 08 and 09 through continuous summary, revision and improvement, It has been listed as a key support project of heilonghui University of science and technology, and has held teaching observation classes and promoted in the whole university.

7 Connotation of Multimodal Cooperation

7.1 Definition of Multimodal Collaboration

Multimodality, that is, a variety of information transfer patterns, including language, posture, materials, music and other multimodal co symbols are integrated to form a

benign interaction. This interaction is not necessary for multimodal people to use the most effective expression mode in the system to infiltrate into College English, because there are different forms in the system, which can meet the advantages of different levels of modes.

7.2 Multimodal Cooperation Principle

The first is multimodality, that is, a variety of information transmission modes, including language, posture, materials, music, etc. multimodal collaboration is to integrate these information transmission symbols to form a benign interaction. This interaction is not simply to input information to the information receiver, but through multimodal high interaction, the information receiver uses the most effective expression mode in the system to promote understanding. It is necessary to the infiltration of the first mock exam into College English writing teaching, because there are different ways of expression in this system to meet the needs of students at different levels of learning [20]. Therefore, we should make use of this model to improve students' interest in writing and writing.

Secondly, multimodal cooperation has the principle of efficiency. Multimodal collaboration can effectively process dynamic visual images, rich audio materials or vivid teaching animations, so that they can cooperate harmoniously and achieve high-quality teaching, which makes students more efficient in the process of learning. By organizing the content expressed by various information transmission modes, these knowledge can be more deeply rooted in the hearts of the people. Multimodal synergy can also improve the amount of memory information of students in a short time, so that students can understand the key knowledge more deeply.

8 Simulation for Improving College English Writing Mode by Multimodal Cooperation

In the face of the diversification of social information technology, the traditional teaching mode has been far from meeting the needs of students for the improvement of their comprehensive English ability. In the process of English writing learning, on the one hand, teachers can promote the transmission of multiple information through the use of multimodal collaboration, and effectively express non-verbal information such as pictures, audio and video, so that students can interpret it in multiple languages; On the other hand, students can also make use of multi-modal collaboration for learning feedback in such an environment to realize the two-way communication between teachers and students.

8.1 On the Main Research Direction of College English Writing Teaching

For multimodal collaborative mode, we should update our understanding with the development of the times. In addition to the application of multimedia in PPT, in the future, we should grasp it from the following aspects: first, students' imitation ability should be promoted in the process of multimodal collaboration. At present, College English writing teaching pays more attention to the inculcation of theoretical knowledge and

writing skills, and ignores the students’ understanding and application of these contents [21, 22]. Therefore, we should adopt imitation activities based on computer network system in the multimodal collaborative development teaching environment, so that students can watch network video, animation and other non text information, This kind of interesting classroom activity can also enhance students’ interest in writing. It not only helps students to use logical sentences and paragraphs correctly, but also improves students’ ability of deep level structure, The cultivation of this ability makes students have a deeper understanding of English writing and abandon the original stereotyped writing routine. The mathematical model of constructing multi constraint shortest path objective function is as follows:

$$C(Pod) = \frac{1}{\sum_{L_{uu} \subset Pod} \delta |L_{uu} + W_{uu}|} = \frac{1}{\delta |Pod| + \sum_{L_{uu} \subset Pod} W_{uu}} \quad (2)$$

8.2 The Enlightenment of Multimodal Collaboration on College English Writing Education

The improvement of teachers’ ability and quality [3, 4]. Through the research, we can know that multimodal collaboration has an important impact on College English writing. First of all, as the participants of teaching activities, teachers should make sufficient preparations before class. In terms of content, they should pay attention to that language and words are always the main modal forms in the process of writing teaching, and other modes can play an auxiliary role in the collaborative process. As shown in Fig. 3. They can not only focus on the diversity of forms, but also ignore the meaning of writing itself. Secondly, teachers should pay attention to the coordination of the interaction between various modes, choose the main mode and the secondary mode, and combine the primary mode and the secondary mode in the process of practice, so as to avoid the confusion of words, sounds and pictures, interfere with students’ writing learning logic, and strive to create a natural writing learning environment. Finally, teachers themselves should improve their reading and writing ability, and actively deepen the learning of multimodal knowledge [23, 24]. Multimodal interaction in China’s education is still in its infancy, many research results are not perfect, so teachers should explore in classroom teaching practice, to find more conducive to students’ English writing learning multimodal collaborative environment.

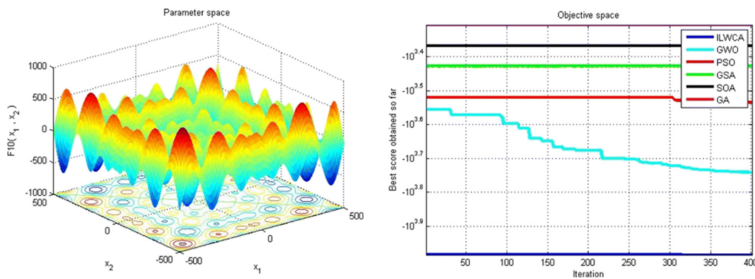


Fig. 3. Results of simulation with improved colony algorithm

9 Conclusions

To sum up, the multimodal collaborative teaching mode can combine multiple social symbols, including words, images, sounds, etc., which can not only fully mobilize the sensory stimulation of college students, but also stimulate their interest in learning, so that they can actively participate in classroom learning. In the process of English writing, it can also help students to effectively understand the basic knowledge of English and improve their comprehensive ability of English writing. Therefore, we should make full use of multimodal collaborative teaching in the future college English writing course. Taking the specific teaching content of the course as the task, it is divided into several groups according to the number of teaching objects (students), and the groups are required to correspond to the tasks. After careful discussion and study before the group class, it is a new teaching mode to explain some details of the task completion for other students and teachers in the classroom. The practice shows that the teaching mode has the following characteristics: The whole teaching task of collaborative task oriented is completed by students, including from pre class preparation to classroom teaching, which is a completely “student-centered” teaching mode; Collaborative task oriented teaching mode is composed of student team, oriented task, evaluation system and teacher’s role, Its performance evaluation system consists of classroom explanation, lecture notes and scientific papers. Teachers only play the role of guiding task allocation, team building, classroom comments, content summary and knowledge carding.

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