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# *An Exploration on the Model of College Curriculum Education Based on the Theory of Ecology of Education—A Case Study of Ecology, a Major Course of Environmental Science*

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***Abstract:*** In view of the lack of inner driving force and poor education effect of curriculum education subjects in colleges and universities, this study innovatively introduced the theory of ecology of education, and established a curriculum ecosystem education mechanism that promotes teacher-student emotional communication and co-construction between teachers and students. On the basis of the research on curriculum reform, adhering to the concepts of "student-centered", "output-oriented" and "moral cultivation", a comprehensive curriculum education model has been formed, featuring collaborative education between teachers and students and diversified assessment, featuring 2-subject collaborative construction, 4-link strengthening of emotional communication and feedback between teachers and students, diversified teaching activities and diversified assessment. Through the process of implementation, feedback and improvement, the model has effectively stimulated the vitality of both teachers and students, and achieved remarkable education results.

The new period of China's social development requires universities to cultivate high-level talents with all-round development of "knowledge, ability and quality". Therefore, the traditional curriculum "knowledge based" "teaching" mode must be changed to "knowledge - ability - quality" trinity of "education" mode. How to improve students' learning enthusiasm, strengthen teachers' teaching input and education consciousness in order to improve the education effect is the key problem facing the current college talent training.

## 1. Theoretical basis for reform

### 1.1 Ecosystem theory of curriculum education

Educational ecology studies various educational phenomena and their causes with ecological concepts, thus revealing the law of educational development, and obtaining important results in solving existing problems in the field of pedagogy, preventing potential crises, providing theoretical guidance for educational ecological practice activities, etc., which is regarded as an effective

method to diagnose, analyze and solve practical problems in the field of education. Based on the theory of ecology of education, this research innovatively puts forward the theory of ecosystem of curriculum education.

The biological body of the curriculum education ecosystem includes two functional groups, teachers and students. The internal environment of the system consists of the material education environment that provides educational resources and the psychological education environment that teachers and students jointly create. The curriculum education ecosystem receives the resources, talents and information input from the external educational environment, and through the three ecological processes of emotional connection, knowledge transmission and information feedback, teachers and students cooperate to complete the educational behavior, produce educational results (including educational resources, educational theories, professional talents and teachers), and export them to the society to realize the overall function of the system.[1] Teachers and students have their own "diversity" and functions respectively, keeping the system stable and efficient output to the outside is the common goal of both sides.

### 1.2. Analysis of the reasons for the low inner driving force of curriculum education subjects

According to the theory of curriculum education ecosystem, if the emotional connection between teachers and students is not close and the teaching process lacks positive feedback, both teachers and students will lack internal driving force, which will affect the efficiency of knowledge-ability transfer and the effect of education. Therefore, the fundamental way to solve the problem is to break the identity barrier of "teacher and student" in the traditional education model, establish the strategic partnership of education and the close emotional connection between students and teachers, and carry out the educational behavior of students and teachers together with students as the center.[2]

## 2. "2+4+N" professional curriculum "three high" education model exploration

### 2.1 Basis of previous research

(1) The relationship between teacher-student emotional communication and the effect of curriculum education

Curriculum education results depend on three ecological processes between teachers and students: emotional connection, knowledge transfer and information feedback. After analyzing the survey data, it is found that students who have positive feedback on teachers and students' emotions (thanks, admiration, hard work, like and other recognized keywords) have higher enthusiasm in course learning and information feedback and self-evaluation. In the reflection of team teaching, teachers also have a consensus: the class atmosphere with smooth interaction between teachers and students and a high proportion of positive feedback from students can improve the professional achievement and the enthusiasm of teaching and research. Therefore, the establishment of close emotional communication is to enhance the inner driving force of teachers and students

The scientific approach.

(2) The relationship between process assessment and learning effect

The development trend of curriculum assessment is to introduce the pluralistic assessment of process learning effect and moral education effect. The process assessment pays attention to the educational process and promotes the transfer of students' knowledge and ability so as to improve the learning efficiency and effect. However, the impact of process evaluation on learning effect is subject and individual differences, so it needs to be carefully designed according to the characteristics of specialized basic courses, course positioning and students' characteristics.

Therefore, this study analyzes the knowledge internalization mechanism of project work and explores the process evaluation reform to stimulate the internal driving force of learning with project work as the starting point.

## 2.2. Construction of professional curriculum education model -- taking Ecology as an example

Based on the construction of provincial-level first-class online and offline hybrid courses in Ecology, this model utilizes online and offline platforms and resources. The professional curriculum education model of "2 subjects, 4 links, diversified teaching activities and diversified assessment" is constructed with the diversified teaching activities coordinated by both teachers and students to strengthen the emotion of teachers and students and curriculum thinking and politics, and the active learning driven by diversified assessment.

(1) Education model design concept and curriculum objectives

This curriculum education model is based on the curriculum education ecosystem theory, with the design concept of "output-oriented", "learning-centered" and "moral cultivation". Curriculum education is based on "knowledge", "ability" as the center, "quality" as the goal, according to knowledge, ability, quality of the three aspects of the education goal is decomposed into 23 indicators, through the design of non-diverse teaching activities to achieve the education goal.

(2) Remodeling of teaching links

The design of the curriculum education link emphasizes the emotional communication between teachers and students and the reflection of teaching feedback, including the four links of course opening, course main teaching, course closing and feedback improvement, giving the opening, closing and feedback improvement the same important status as the main teaching[3]. The beginning of the course is used to deepen the emotional communication between teachers and students and to build a curriculum environment; At the end of the lesson, the course summary, teaching feedback and emotional exchange are carried out, and the feedback improvement is carried out through the reflection, communication and teaching research of teachers and teaching teams.

(3) Design of diverse teaching activities

In the main part of the course, this model stimulates students' interest in learning, promotes autonomy and personalized learning by adding the proportion of student-led and teacher-student collaborative teaching activities. A total of 29 online and offline teaching activities are designed in this model, among which student-led activities account for 5/29 and teacher-student collaborative activities account for 6/29. Through excellent homework comment activities, students can gain a sense of achievement and respect, and pass on positive energy; Teachers' teaching activities mainly teach the latest research frontiers and application cases, difficult problems of students' online learning feedback, and need to emphasize the knowledge points not suitable for self-study, which fully reflects the innovation, advanced and challenging degree, and promotes the transfer of students' knowledge and ability through expanded classroom discussions. The team sorted out the ideological and political elements of the teaching content into the teaching design; Teaching activities such as course organization and management, "Ecology in News Facts" reporting by teachers and students, excellent homework comments, and diversified assessment are integrated into the ideological and political functions of the curriculum. The effect of ideology and politics of the course was evaluated through teaching activities such as course opening investigation, diversified examination and course closing investigation.

(4) Reasonable use of modern digital teaching means

The teaching mode of this course makes full use of online resources and platforms for students' autonomous learning, extra-curricular communication, interaction, feedback and evaluation, etc. 15/29 of the teaching activities are carried out by digital teaching means. The introduction of digital

resources and platforms encourages teachers and students to increase their input in extra-curricular learning and reserve their classroom time for newly added teaching activities. At the same time, the teaching resources are shared immediately to facilitate students' self-study, and the teaching process leaves "traces" to facilitate teachers' course summary, reflection and teaching research.

(5) A diversified assessment system of fine design and integration of moral and intellectual education

This model constructs a diversified assessment system integrating moral and intellectual education to evaluate the effect of curriculum education, and comprehensively evaluates the school effect of students by adding process evaluation indicators. In the examination of discussion, class report, participation in course management, experimental attitude and experimental operation, students' self-evaluation and mutual evaluation are introduced to strengthen students' main function of course teaching; The purpose of teaching evaluation, promoting learning through examination and educating people is to design fine and personalized assignment questions.

The design of examination questions is the key to realize the function of the diversified examination system. In ecology course assessment resources, apart from mastering the basic knowledge of online examination question bank, open, innovative and challenging discussion questions, homework questions and project homework questions are designed considering students' individuality, diversity and learning situation. Teachers' process guidance, group discussion, classroom homework feedback, classroom discussion and other teaching activities promote students' homework learning effect. Relying on the network teaching platform, the course has also built difficult learning resources and examination questions for students to choose independently.

## 3. Model implementation and promotion effect

The education model of this course is gradually established with the construction of ecology curriculum and the practice of teaching reform. The "2+4+N" curriculum education model has effectively improved the vitality of teachers and students since its implementation in the environmental science and environmental ecological engineering majors of our school for two years, and the comprehensive effect is remarkable.

### 3.1 Students' learning input increases significantly

Students completed 11 homework assignments of about 6000 words, 3 comprehensive experiment reports, 475 minutes of online video sharing, 20 flipped course teaching resources, 2,025 interactive answers on 397 topics initiated by the online discussion board, and 20 self-selected class report courseware (51% of students).

### 3.2 Teachers' teaching input has increased significantly

In addition to regular teaching activities such as grading homework, supervising online learning and organizing classroom discussions, the lecturer added the innovative practice of seed germination and the end-of-term project-based homework knowledge test paper independently carried out by students in the daily homework of this semester. After the completion of the project homework, he designed a student-themed communication and discussion link, and completed 15 news reports and 10 excellent homework sharing courseware. The faculty organized one on-site teaching session and one ecology lecture, guided students to participate in teachers' scientific research and apply for various innovation competitions six times, and applied for three curriculum construction projects and teaching reform projects relying on ecology. They updated 23 online teaching resources. The course group pushed professional cutting-edge comments and news 15

times and had one-on-one communication with all students after class.

### 3.3 The education effect has been significantly improved

Students' learning enthusiasm has been improved, and the attendance rate of courses has reached 99% for two consecutive years, with about 30 interactions per capita. The vast majority of students believe that they have made progress in relevant knowledge, ability and quality through the course study (87%). In the past two years, compared with the pre-reform period, the excellent and 18.8 percent of students' scores in the diversified examination have increased respectively, while the failure rate has dropped to 11 percent. The quality of work continues to improve, and the excellence rate of normal work is nearly 1/3, and the excellence rate of final project work is more than 50%.

## 4. Conclusion

The overall teaching effect after the implementation of this teaching mode proves the scientific validity of the design idea. In the next step, the teaching team will continue to conduct in-depth research on the theoretical research of the curriculum education ecosystem, the implementation approach of students' participation in education evaluation, the detailed design of project-based homework and the construction of practical teaching system combining virtual-reality, and strive to overcome the problem of stimulating the learning motivation of students at the bottom.

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