

Integration of Ideological and Political Curriculum into Botany Experimental Teaching in Agricultural and Forestry Colleges

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Abstract: Ideological and political education is an important direction of curriculum reform, which aims to explore the organic combination of ideological and political elements and professional knowledge in the teaching process of professional courses, and enhance the guidance of students' ideological education while teaching knowledge. Botany experiments are an important part of the botany courses in agricultural and forestry colleges. This article takes the botany experimental courses as an example to explore the necessity, methods, and processes of implementing ideological and political education in the botany experimental courses, and to explore the practical teaching of botany experiments. The potential ideological and political elements existing in the course were excavated, and the results of integrating ideological and political education in the botany experimental course were summarized, which provided a guideline for the better implementation of ideological and political education in the botany experimental course.

Keywords: Ideological and political education; Exploration and practice; Botany experimental courses

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1. Introduction

As a new comprehensive education concept, the ideological and political curriculum takes moral education as the primary task of education. Its purpose is to integrate professional courses with ideological and political theoretical courses to achieve coordinated development, and walk in the same direction through the implementation of all-round education. In 2019, it was emphasized that, "we must adhere to the unity of explicit education and implicit education, explore the ideological and political elements contained in the curriculum, and achieve all-round education for all employees"^[1]. The Ministry of Education issued the "Guidance Outline for the Construction of Ideological and Political Curriculum in Colleges and Universities" in 2020, which requires that ideological and political education be integrated into professional course teaching, and comprehensively promote the construction of ideological and political courses in colleges and universities^[2]. Therefore, methods to integrate ideological and political education into the whole process of professional course teaching, and then strengthen the construction of ideological and political education, is an important issue that every teacher in

colleges and universities needs to think about.

2. The feasibility and necessity of integrating ideological and political education into botany experimental teaching in agricultural and forestry colleges

Botany experiment is a required basic course for majors in agronomy, plant protection, horticulture, agricultural resources, environmental science, forestry, and ecology in agricultural and forestry colleges. It is an independent course established closely combined with the botany course. It includes two parts, which are indoor experimental teaching and field practical teaching. The content of botany experimental teaching mainly includes plant cells and tissues, plant vegetative organs, plant reproductive organs, plant groups and classifications, etc. It contains rich ideological and political materials. At the same time, the teaching time span is long, thus providing opportunities for the development of ideological and political education, as well as a wealth of material selection and time guarantees. Freshmen have just entered university after three years of high school, they are in the formation period of a correct world view, outlook on life, and values. They are also in a critical stage of cultivating professional thinking and qualities. At the same time, they are facing various new information challenges. One of the directions for future efforts in the reform of botany experimental teaching involves how to organically integrate the ideological and political elements in the teaching content into the teaching process of the botany experimental course according to the course training plan, so as to achieve the fundamental goal of “cultivating people with moral integrity.”

However, in traditional botany experimental teaching, the teaching process mainly imparts professional knowledge to students face-to-face in the classroom. After the 19th National Congress of the Communist Party of China, China has entered a new period of building a moderately prosperous society in an all-round way. The fundamental goal of education is to cultivate people with moral integrity. The ideological and political construction of colleges and universities has new development requirements. Ideological and political education is carried out in botany experimental courses. It can strengthen teachers’ educational concepts of teaching and educating people, provide students with valuable guidance from multiple dimensions, stimulate their motivation and enthusiasm for learning professional courses, cultivate their scientific research and exploration spirit, shape students’ humanistic qualities and moral character, and truly realize the curriculum that “establishes moral character and cultivates people”^[3-5].

3. Strategies for integrating ideological and political education into botany experimental teaching in agricultural and forestry colleges

Botany experiments are an important part of the botany curriculum. The purpose of the course is to enable students to master the basic experimental skills and research methods of botany, strengthen their understanding of theoretical knowledge of botany, cultivate students’ independent thinking and innovation abilities, improve students’ observation and hands-on skills, prepare students for subsequent professional course study and scientific research, and lay the foundation for the work to proceed. Through an in-depth analysis of the teaching content of the botany experimental course, the entry point of the ideological and political course was discovered, and the ideological and political course and the experimental teaching content were closely integrated (**Table 1**). During the whole teaching process, teachers change the traditional education concept of “emphasis on teaching over learning.” They should not only focus on the improvement of students’ professional knowledge and skills, but also strengthen students’ ideological level, moral quality, humanistic quality, scientific innovation spirit, and value orientation, and other aspects of comprehensive quality cultivation, and promote the

all-round development of students' moral, intellectual, physical, artistic, and labor aspects.

Table 1. Ideological and political design of botany experimental course

No.	Teaching topics	Teaching content	Ideological and political integration points in the curriculum
1	The structure and use of digital interactive microscopes and the observation of the basic structure of plant cells	<ol style="list-style-type: none"> 1. Learning how to use a digital microscope. 2. Observation of sections of various plant materials: cell wall, cytoplasm, nucleus, vacuole, plasmodesmata, chloroplasts, chromoplasts, leucoplasts, cytoplasmic flow, proteins, fats, starch granules, etc. 	Professional quality, research and exploration, facing difficulties, and the beauty of ordinary but not mediocre life
2	Plant cell division and observation of plant tissues	<ol style="list-style-type: none"> 1. Observation of the characteristics of amitosis and mitosis in plant cells. 2. Observation of the meristematic tissue, protective tissue, conductive tissue, mechanical tissue, basic tissue, secretory tissue, etc. of the plant. 	Social responsibility and division of labor, scientific spirit, and dedication
3	Nutritional organs: Observation of the morphology and anatomical structure of roots, stems, and leaves	<ol style="list-style-type: none"> 1. Observation of root system and root tip partitions. 2. Observation of primary and secondary structures of roots. 3. Structure and type of buds; observation of primary and secondary structures of stems. 4. Types of leaves: complete leaves and incomplete leaves, single leaves and compound leaves. 5. Observation of the structure of leaves of monocots and dicots. 	National stability and social development, ecological awareness and sustainable development, and application of environmental changes
4	Reproductive organs: Observation of the morphology and anatomical structure of flowers, fruits, and seeds	<ol style="list-style-type: none"> 1. The components of a flower: pedicel, receptacle, calyx, corolla, stamens, and pistils. 2. Fruit types: observation of food specimens, pictures, and photos. 3. Seed structure and types: the basic structure of dicotyledonous plant seeds (seed coat and embryo), the basic structure of monocot seeds (seed coat, embryo, and endosperm). 4. Anther and ovary structure: ovary (ovary wall, ovary chamber, ovule placenta), anthers (septa, pollen sacs). 	Seek truth from facts, be scientifically rigorous, adapt to the environment, and be positive
5	Plant groups: Observation of representative types of lower and higher plants	<ol style="list-style-type: none"> 1. Observation of the morphological characteristics and ecological environment of various types of plants, analysis and clarification of the unity of the internal structure and external form of the plants. 2. Observation of various types of plants separately: lower plants; algae; fungi; lichens; higher plants; bryophytes (bryophytes, mosses); ferns; gymnosperms; angiosperms. 	Ecological protection, scientific spirit, innovative thinking, communication, teamwork, and life awareness
6	Botany field practice, collection of plant specimens	Students are organized to conduct field internships in Nanning Flower Park, Medicinal Botanical Gardens, campuses, farmlands, orchards, etc., conduct plant surveys, collect plant specimens, learn basic survey methods, and learn about 70 to 80 common plants.	Beauty of life, respect for life, environmental awareness, aesthetic taste, pragmatism and rigor, and hard work
7	Identification of plant specimens for botany internship	Using reference books to identify plant specimens collected in the field and prepare specimens. Becoming more familiar with plant morphology terminology, the use of reference books, and the preparation of search tables.	The attitude of the older generation of scientists to try their best to realize the value of life, and cultivate the perseverance and unyielding spirit of "not even a prairie fire can destroy the grass; it grows again when the spring breeze blows"

3.1. Analyzing the teaching content and exploring the ideological and political integration points in the course

By explaining rules and regulations including the laboratory safety system, and the standardized operation of instruments and equipment such as digital interactive microscopes, students are guided to take good care of laboratory instruments and equipment. After the experiment is completed, the laboratory must be returned to its original state to cultivate students' good professional qualities. The basic structure of cells is a microscopic structure, and students know very little about it. Through observation of the experimental content, the scientific spirit of delving into exploration and facing difficulties are cultivated, while also emphasizing the beauty of ordinary but not mediocre life.

For the division of plant cells and the observation of plant tissues, the teacher teaches the students that everyone's division of labor is different, just like the various tissues of the plant bearing different functions. The teacher also silently guides the students' social responsibilities and division of labor, and promotes the spirit of dedication.

For the observation on the morphology and anatomical structure of vegetative organs, the teacher will introduce the importance of the stability of the country and social development to students through the biological mechanism of deep roots, luxuriant leaves, and strong branches. Through the introduction of the metamorphosis of plant organs, students will know the importance of awareness of ecology and sustainable development, and adapt to changes in the environment.

When learning about the experiment on reproductive organ, for example, the teacher introduced the seed bank and told the students that in order to collect plant seeds, Professor Zhong Yang of Fudan University reached the uninhabited land of Tibet. When describing seeds, the hybrid rice breeding and super rice breeding of Yuan Longping, the father of hybrid rice, are introduced. Through "Mosses bud like rice, yet bloom like peonies," students are told that their destinies and environments are different, but their dreams are the same, and they are all trying to grow and bloom. This is true of nature, and so is life.

By learning the characteristics of plant groups, students are guided to understand the plant species, observe the relationship between plants and the environment, advocate and respect nature, and practise the core concept of ecological civilization construction that "lucid waters and lush mountains are invaluable assets." In the teaching process, we fully explore the traditional cultural knowledge points about plants. For example, when learning to observe bryophyte, we introduce "Moss" written by Yuan Mei, analyze the morphological characteristics of bryophytes in the poem, and the spiritual quality given to the plants by the author, and use it to entrust objects to express aspirations and convey feelings to students in order to achieve implicit ideological and political goals. When learning the characteristics of Asteraceae plants, teachers can introduce the artemisinin extracted by Tu Youyou, the 2015 Nobel Prize winner in Physiology, which has contributed to reducing the mortality of malaria patients in Africa, thereby allowing students to personally feel the cultural confidence of the Chinese nation. It also allows students to learn the spirit of courage to explore from their predecessors, regardless of fame and fortune, and silent dedication.

In order to effectively improve the teaching quality of botany experimental courses, botany field practice, and plant specimen collection and production experiments were conducted focusing on Nanning Flower Park, Medicinal Botanical Garden, and campus plants. Teachers can lead students to conduct on-site observation, let students understand the tenacity of plant life, and guide students to respect life, and have environmental awareness and scientific literacy. In the plant specimen collection and production experiment, students usually work in groups of 2–3. During the process of collecting specimens, students' hands-on skill, cooperative spirit, and rigorous quality are cultivated; specimens displayed in the college's herbarium are used to explain their

stories and the interesting things that happened during the field collection in order to stimulate students' interest in learning botany, and strengthen their awareness of the sustainable development and utilization of plant resources.

In the content of learning the identification of plant specimens through botany internship, "Flora of China" was introduced as a masterpiece with the richest collection of species in the world at the time of its publication. The entire preparation and completion of the work lasted for nearly 80 years, thus marking that the basic theoretical research on Chinese botany has reached the world's advanced level and inspiring the patriotism of the students.

3.2. Reforming teaching methods and integrating ideological and political education into the teaching process

Applying information technology to course teaching is an increasingly popular trend. In 2021, the project "Research and Practice of the 'Micro Class + Flipped Classroom' Hybrid Teaching Model of Botany Experimental Courses in Agricultural and Forestry Colleges" funded by the Department of Education was received. The project selected agricultural botany experiments, which are the course most widely taught in the college, as the target of reform. We seize the main contradiction of the low degree of informatization of the current botany experimental courses. Based on the school's existing hardware and software conditions, we use modern information technology as the main means to conduct online courses. The "precise combination" of online and offline teaching has been usefully tried and discussed, and the experimental teaching method has been innovated. At the same time, the rich teaching resources on the Internet have been used to fully explore the potential ideological and political elements of the course, forming a student-centered teaching method.

3.3. Introducing typical cases to provide ideological and political education to students

In order to improve students' interest in learning, we combine the teaching content, explore the ideological and political integration points in the course, and reform the teaching methods. At the same time, through the design of ideological and political cases in the course, they are integrated into experimental classroom teaching, which not only completes the learning of course knowledge, but also achieves the purpose of teaching and educating people.

When teaching the experiments on the morphology and structure of vegetative organs, *Populus euphratica* is used as a typical case. *Populus euphratica* lives in the desert all year round. After thousands of years, the structure of its plant has gradually become specialized due to drought and desertification of the soil, so as to adapt to the drought. It grows in an environment of saline-alkaline, severe cold, scorching heat, sandstorm, and poor soil conditions. It is currently the only tall tree that can survive in the desert. It promotes students' understanding of the role of "survival of the fittest" in evolution and guides students to correctly face difficulties and setbacks, thus establishing the spirit of perseverance, tenacious struggle, and self-breakthrough.

4. The effectiveness of integrating ideological and political education into botany experimental teaching in agricultural and forestry colleges

The Botany Experimental Course integrates ideological and political education throughout the entire process of experiments and field practice. It uses online and offline hybrid teaching methods to improve students' initiative and enthusiasm for participation, making the classroom come alive and achieving good teaching results.

First of all, botany experimental courses have become an important channel to provide valuable guidance to students. In the botany experimental teaching, different ideological and political elements are designed

for each experiment. Ideological and political teaching courses have been carried out for three consecutive undergraduate students, and have shown good ideological and political teaching effects. The education of students' ideals, beliefs, and core values, education of excellent Chinese traditional culture, education of ecological civilization, and education of professional qualities have achieved a silent effect and have been generally recognized by students.

Secondly, it improves students' interest and enthusiasm for learning professional courses. Through the narration of stories about Chinese scientists in the course, ancient poems related to the clever use of plants in teaching, and the reform of online and offline hybrid teaching methods, students are guided to love the major, students' learning and memory of this professional knowledge are strengthened, and botany experimental courses have also become popular professional courses among students.

5. Conclusion

For a long time, ideological and political education in colleges and universities has been mainly undertaken by ideological and political theoretical courses and college counselor education. Through ideological and political courses, botany experimental course channels have been enriched and the educational environment has been innovated^[6]. Botany experiment is a very important professional basic course in agriculture and forestry. It has a very wide audience of students. The teaching time falls in the first semester after students enter the university from high school. The correct ideological and political education orientation of the course is crucial to cultivating good ideological and moral character. New agricultural science talents with correct and positive values are of great significance.

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