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Practice and Exploration of Ideological and Political Teaching in Plant Physiology Course under the Background of New Agricultural Science

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Abstract: As the core course of seed science and engineering, ”Plant physiology”assumes a vital role in advancing ideological and political teaching practices under the background of new agricultural science. This paper primarily examines the ideological and political implications within the plant physiology course of the seed science and engineering discipline, analyzes the current problems in the ideological and political construction of plant physiology courses in colleges and universities, and proposes optimization principles and improvement methods to fortify ideological and political construction in plant physiology courses. By enhancing both professional knowledge and ideological development, these efforts aim to synergistically advance both academic prowess and ideological maturation and implement the fundamental objective of cultivating virtuous individuals.

1. Introduction

In the 20th National Congress of the Communist Party of China, General Secretary Xi emphasized the importance of providing “satisfactory education for the people”. Guided by the spirit of this Congress, the ideological and political construction of courses under the background of new agricultural science has taken a significant leap forward. It is crucial to foster precise thinking, address specific challenges, and seize emerging opportunities in ideological and political teaching [1]. Higher education has the mission to cultivate individuals, with the fundamental goal of virtuous character development. Presently, a key educational task is integrating socialist core values and a proper value system into the core curriculum of universities. In 2018, General Secretary Xi underscored at the National Education Conference: “The fundamental question of education is whom to nurture. Our country is a socialist nation led by the Communist Party of China, which dictates that our education must prioritize the cultivation of socialist builders and successors as its core task. This involves nurturing generations of capable individuals who staunchly support the leadership of the Communist Party of China and the socialist system of our nation, and who are

committed to dedicating their lives to the pursuit of socialism with Chinese characteristics." Since the 18th National Congress of the Communist Party of China, ideological and political education in colleges and universities has risen to a strategic national priority. In the setting of university curricula, ideological education for students should extend beyond dedicated courses and professors and become a shared mission among ideological and professional educators [2]. In this context, the reform and exploration of course ideology and politics should conform to the demands of contemporary development. The essence of "course ideology and politics" advocated today is not just conceptual but also practical in its influence. To embody this educational philosophy, it necessitates that all educators in higher education institutions collaborate to construct a cohesive curriculum framework, thereby assuming the responsibility and obligation of "all-round education". Professional course teachers should internalize their enduring in cultivating virtue and educating. Throughout the process of teaching their specialized subject, they should focus on excavating educational resources closely linked with specialized courses, build an ideological and political framework aligned with the professional curriculum, reinforce educational ideals for character development, and formulate integrated teaching objectives that encompass "concept cultivation, value guidance, knowledge inheritance, and skill cultivation". The aim is to promote all teaching activities and teaching processes to uphold the fundamental principle of character cultivation, align with ideological and political education, create a synergistic effect, collectively promote character and professional development, and maximize the coverage of ideological and political education throughout the whole process in all channels, thus greatly improving students' ideological and political awareness, scientific and cultural literacy, and political consciousness. Therefore, the integration of course ideology and politics is an overarching trend.

As the core course of seed science and engineering, plant physiology mainly focuses on the law of plant life activities and closely links to the rapid development of modern agriculture, the varying natural environment, and the swift advancement of biotechnology. Although plant physiology is often viewed as a natural science, multiple courses of natural physiology contain extremely rich ideological and political elements. The knowledge framework of plant physiology encompasses professional qualities such as scientific thinking, objective viewpoint, commitment to truth and pragmatism, and continuous improvement, which constitutes a crucial part of the positive value orientation advocated by all-round and whole-process education as well as ideological and political teaching [3]. The knowledge and practical achievements of plant physiology are closely related to agronomy, ecology, national agricultural development policies, spiritual civilization, institutional self-confidence, humanistic quality, ecological awareness, responsibility and mission, etc. The primary goal of ideological and political exploration in plant physiology courses lies in the efficient excavation, unobtrusive integration, and rapid transmission of the internal ideological and political elements through timely and appropriate teaching methods.

2. Analysis of ideological and political implications in "plant physiology" course

2.1. Implication I: The unity of knowledge and values

To integrate "ideological and political education" into plant physiology courses, we must adhere to the principle of unifying knowledge and values, which stands as the core of determining "what to teach", "why to teach" and "how to teach". The basic task of the plant physiology course revolves around imparting essential agricultural production skills concerning the fundamental laws governing plant growth, addressing the intellectual question of "what to teach". Delving into the "why to teach" and "how to teach" questions uncovers the significance of infusing ideological and political education into the plant physiology course. The course encompasses professional knowledge, skills, and scientific principles, all situated within a specific social and political context.,

which should not only serve national and social progress but also align with the evolving intelligent and scientific background of our times. Consequently, this course extends beyond the dissemination of mere professional knowledge and skills to strong social and humanistic attributes. Plant physiology delves into nurturing scientific spirits, life consciousness, and other realistic concerns tied to plant growth and development. Moreover, it closely intertwines with the education of seed science and engineering professionals. While the basic unit of plants is cells, the intricacies of cellular structure, function, reproduction, and development operate independently of human intention. However, when researchers delve into the underlying laws of life in a humanistic way, plants transcend into the intellectual realm, shaped by the researchers' perspectives. This pattern invariably embeds these researchers' values and attitudes, underscoring that plant physiology inherently carries attributes of value. Overlooking this aspect and focusing solely on knowledge delivery while undervaluing cultivation and values, will inevitably ignore students' inner requirements of spiritual values and weaken the formative influence of systematically imparted plant physiology knowledge on students' literacy and value orientation. Hence, the practice of ideological and political construction in plant physiology courses remains imperative to uphold the principle of unifying knowledge and values.

2.2. Implication II: The unity of science and humanity

Ideological and political education in the plant physiology course must adhere to the principle of unity of science and humanity. Plant physiology finds its place within the domain of natural science, with its inherent characteristics dictating the scope and essence of this course. Therefore, the reflection of diverse laws governing the growth and development of plants necessitates scientific research methods and professional knowledge. The scientific essence of this course is mainly reflected in the certainty of its research object, the objectivity of its research principles, and the utilization of comprehensive and scientific research methods. On the other hand, the humanism of plant physiology predominantly surfaces in the initiative and the cultivation of a spiritual realm during the transmission of objective scientific knowledge, which is embodied in understanding and applying language, emphasizing life, and nurturing a humanistic spirit. Focusing solely on the scientific nature of instruction while neglecting the significance of humanistic values could give rise to dogmatism and transform students into mechanical rationalists without emotion. However, if only the humanistic value is promoted and the scientific nature is ignored, the humanistic value will be enshrouded in mysticism and unfounded beliefs. Plant physiology is a holistic study that embraces not only the botanical world but also humanity, which was established and developed by humans to serve themselves. Thus, the ideological and political teaching of plant physiology necessitates the unity of science and humanity, to truly reflect the synergy between subject and object and the organic integrity of humans, plants, and society.

2.3. Implication III: The unity of procedural and educational aspects

The plant physiology course must steadfastly uphold the principle of harmonizing the process and conclusion. Within the realm of plant physiology, knowledge accumulates and evolves through a continuous process of self-correction, and the generation of every plant physiology concept depends on the unremitting investigation of scientists. These research endeavors not only illuminate the scientific mindset and research methods but also underscore the synergy, collectivity, and cooperation among scientists. According to the curriculum outline, the teaching content of plant physiology should seamlessly intertwine with the goal of "course ideology and politics". A pivotal avenue lies in nurturing students with scientific literacy and pragmatic research attitudes possessed by researchers, according to the scientific attributes of the course. Such literacy and concepts

naturally come to fruition during the acquisition of theoretical knowledge and experimental operations. In the contemporary era, the continuous expansion and improvement of plant physiology contribute to scientific research with innovative spirits, which requires researchers to possess fundamental attributes like unceasing self-innovation, exploration spirits, cooperation consciousness, dedication, and clear academic ethics in the process of exploration. Therefore, to reflect the educating function of the plant physiology course, it is necessary to genuinely internalize the meticulousness, authenticity, and standardization inherent in scientific research during the process of learning and exploring. Equally crucial is grasping the attitudes and perspectives of researchers toward scientific research, the ethical concerns involved in technological applications, the humanistic care, social responsibility, team spirit, and collaborative awareness that underpin scientific pursuits. Moreover, we should pay more attention to the cultivation of research moral consciousness, which is one of the important guarantees for integrating "course ideology and politics" within plant physiology.

3. Challenges in integrating ideological and political education into higher education plant physiology courses

3.1. Emphasizing offline teaching, neglecting online teaching, and forcing ideological and political content into the course

Currently, whether in agricultural and forestry colleges or comprehensive universities, the plant physiology course primarily relies on traditional offline teaching mode, in which teachers take the lead role in imparting knowledge, resulting in passive student engagement. The flow of information and knowledge exhibits a one-way direction, which can diminish student motivation and hinder their active engagement in learning [4]. With the advent of the big data era and advancements in teaching techniques and technology, the shortcomings of this traditional offline teaching mode have become increasingly apparent. Furthermore, passive indoctrination in offline teaching tends to reduce classroom participation and poses challenges in effectively integrating ideological and political content into the course.

3.2. Overemphasizing professional knowledge and ignoring the unobtrusive integration of course ideology and politics

General Secretary Xi emphasized at the National Conference on Ideological and Political Work in Colleges and Universities that ideological and political work should be integral to the entire education process, ensuring whole-process and all-round education. Aside from the plant physiology course, other professional theoretical courses should adhere to course ideology and politics to form a joint force. At present, there is a common misconception among teachers and students in Chinese colleges and universities that the responsibility of "value-oriented" and "ideological-oriented" education, advocated in course ideology and politics, solely falls upon ideological and political courses, while professional courses are only responsible for imparting professional knowledge, skills, and research abilities. This over-emphasis on the professionalism of professional courses leads to a disconnect between ideological and political courses and professional courses performing their respective duties. As a result, it becomes challenging to achieve the ideal training goal of "aligned guidance and cooperative education", and teachers and students prioritize professional studies over ideological and political education. This approach can eventually result in the loss of ideological and political guidance in the systematic teaching of professional courses, leading to a separation and even conflict between cultivating scientific literacy, transmitting systematic knowledge, and providing value-oriented guidance in professional

education. To address this issue, teachers should incorporate both virtue and ability into their teaching activities. They must lead by example, utilize primary teaching methods effectively, and leverage supplementary channels concurrently. While unobtrusively integrating course ideology and politics, they should also maintain the basic framework of discipline knowledge and value system of plant physiology.

4. Practice and exploration of ideological and political teaching in the plant physiology course

4.1. Optimization of teaching principles

The ideological and political elements of plant physiology are inherently interconnected and complementary with ideological and political education, but this interconnection cannot accurately ensure the seamless integration of ideological and political education into every chapter of plant physiology. Instead, teachers must strike a balance between conveying professional knowledge, nurturing scientific literacy, and delivering ideological and political guidance effectively, which necessitates continuous adjustments and optimization of teaching principles throughout the teaching process.

4.1.1. Respecting the teaching system within the plant physiology discipline

The teaching system of plant physiology encompasses years of theoretical accumulation and ongoing experimental practice. Its integrated framework of theoretical coursework, experiments, internships, and practical experiences requires that the evaluation and examination of the course should not only reflect distinct professional characteristics but also closely serve the professional training objectives. Therefore, when incorporating ideological and political elements into the plant physiology course, it is crucial to respect the inherent knowledge framework and system of the course. Haphazard integration not only results in rigid teaching methods but also destroys professional development goals and disciplinary characteristics. This approach hinders the expression of professionalism and fails to garner student support, rendering effective ideological and political education within the course unattainable. The principle of respecting the existing teaching system can be applied across multiple courses, demonstrating its enduring relevance.

4.1.2. Ensuring the close connection and complete knowledge system between plant physiology and other disciplines

Plant physiology serves as a foundational course in agricultural studies and the organic carrier composed of related professional knowledge systems. The arrangement of its chapters and their seamless transitions reflect the historical development and context of plant science and biology, illustrating the close interconnections between various concepts. Thus, ensuring the systematic and comprehensive nature of plant physiology knowledge is not only the teaching foundation of the course but also its core objective. However, it is equally important to maintain strong connections between plant physiology and other disciplines and avoid the phenomenon of reducing the teaching hours of professional knowledge or randomly changing the original chapters of the course to accommodate mere ideological and political education. It will not only damage its professionalism but also result in ineffective integration of ideological and political elements.

4.1.3. Maintaining the disciplinary value system of plant physiology

The knowledge system core of the plant physiology course lies in recognizing, understanding, and deciphering the growth and development law of living organisms, naturally forming

disciplinary values of seeking truth, being pragmatic, embracing nature, caring for life, and cherishing the environment. Therefore, to subtly integrate ideological and political education into the plant physiology course, it is imperative to adhere to the inherent values of the discipline and prioritize cultivating students' value values of seeking truth, practicality, scientific rigor, and a caring attitude toward life in professional education and course ideological and political integration. Once the course ideologies and politics in the plant physiology course deviate from the value system of the professional discipline, the professional course can be easily transformed into a purely ideological and political course, which fundamentally undermines the rigor and seriousness of the professional course and fails to garner genuine recognition from students. Hence, integrating ideological and political education into the plant physiology course should not only respect its intrinsic value system but also follow a gradual and systematic approach (as shown in Figure 1).

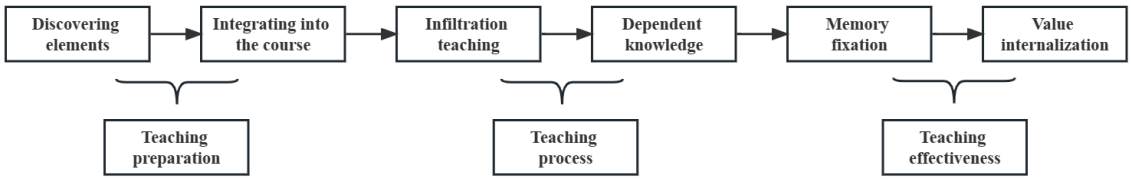

Figure 1: The Process of integrating ideological and political education into the plant physiology course

4.2. Enhancement of teaching methods

4.2.1. Building "thematic integration" of teaching content based on textbooks to promote the transition from the textbook system to the teaching system

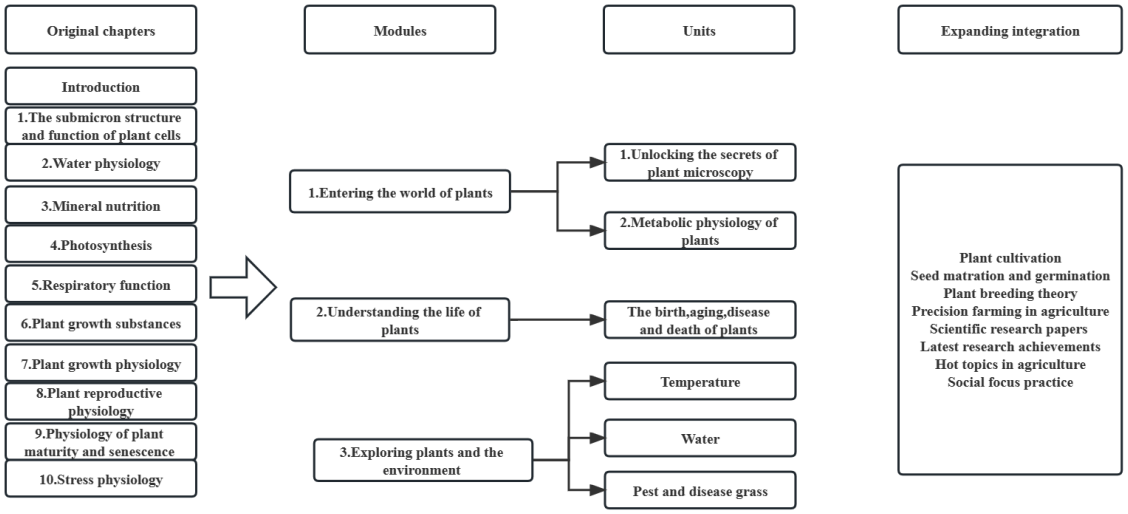

Figure 2: "Thematic integration" of ideological and political education into the plant physiology course

Based on the course textbook system, the existing ideological and political elements related to plant physiology should be reviewed and enhanced, and the theme framework of the textbook should be refined. According to the course nature and training objectives, teachers should grasp the key points, difficulties, and error-prone points, establish the introduction of textbook content, and gradually form a specialized teaching module. Meanwhile, they should study students and refine the

growth theme that aligns with the course content. They can collect students' concerns through questionnaires, WeChat voting, Learning Pass, and other channels, establish a database of students' focus on the theoretical content of plant physiology, and form a repository of "how to integrate ideological and political education into the plant physiology course". Integrating the growth themes with textbook themes and refining the teaching themes contribute to various ideological and political themes covering all chapters of plant physiology and a comprehensive framework for the teaching content (Figure 2).

4.2.2. Improving the "problem chain teaching" method based on personnel training to foster unified stimulating and in-depth education

Based on the talent training scheme and the teaching system theme, the "problem chain teaching" method is improved. Teachers should divide the main teaching theme into sub-problems and take these problems as the course starting point. Moreover, it is necessary to design a "problem chain" according to the law of plant growth and development or experimental process to stimulate students' curiosity for knowledge. By systematically explaining, teachers can unravel the "problem chain" and illustrate the rigor and logic of the knowledge framework. The "problem chain teaching" method breaks away from starting with conclusions and instead guides teaching through a problem chain, emphasizing the unobtrusive integration of ideological and political education into the course.

4.2.3. Constructing a multi-level teaching mode of "main classroom" based on ongoing teaching to promote the integration of "main classroom" and "extended classroom"

Based on the principle of ongoing teaching, teachers should concentrate on the main classroom to construct the multi-level teaching mode of "main classroom +" and broaden the teaching time and space. (1) Experiment, internship, and practice classes: Emphasizing classroom practice as the focal point, with experimental work and practical internships as the supporting wings, teachers can create a practical teaching mode of "one focus and two wings", an "ideological and political case library in plant physiology", and "in-depth study of agricultural classics", to facilitate the integration of the main classroom with experiments and practical internships. (2) Online classes: Leveraging the Learning Pass platform provided by the school the WeChat public account dedicated to the seed field, teachers can record the contents related to plant physiology and course ideologies and politics and build an online teaching space. (3) Humanities classes: According to the professional training plan and teaching objectives, special topics such as symbiosis between environment and plants are set up to expand students' humanistic and scientific horizons.

4.2.4. Enhancing teaching methods of combining explicit educational concepts with implicit teaching models through "dual-mode" education

In agricultural courses, it is often not advisable to directly impose explicit ideological and political education on students, as it can backfire and lead to resistance. In the teaching process of plant physiology, we primarily adopt an implicit educational approach that "plants" ideological elements subtly within the course content, while the explicit education mode is the auxiliary one, creating a blended "dual-mode" teaching method within agricultural courses. Compared to explicit education, implicit mode seamlessly integrates ideological and political elements into the course content, making it easier for students to subjectively embrace and yield more effective results. The explicit mode can be focused on current political affairs, especially those topics that students are concerned about, such as issues related to postgraduate entrance exams. These can be incorporated into relevant sections of plant physiology, making the students more receptive and achieving better results. For example, integrating the new policies, documents, and laws issued by the state into

plant physiology can guide students to care about current affairs, the country, and agriculture, and guide students to establish correct values, facilitating students' acquisition of the education of agriculture, rural areas, and farmers and their sense of responsibility and mission of rural development. Furthermore, during the integration of the "dual mode", teachers can directly inspire students with motivational statements, ignite their interest in learning, and encourage them to adopt the resilient growth spirit of plants, coupled with a strong sense of social responsibility, cultivating a life attitude in students that mirrors the "phototropism" seen in plants – always reaching upward. Additionally, in the ideological and political teaching of plant physiology, teachers can also emphasize the stories of historical characters, which can spark students' interest, ignite their patriotic passion, help them appreciate the significance of plant physiology and the scientists' relentless pursuit of knowledge, and showcase the contributions of Chinese scientists to agricultural and economic progress. By collecting historical events related to plant physiology (such as the "Irish Famine" caused by potato late blight, etc.), teachers can make rational use of these materials in teaching, guide students to understand the important role of plant physiology in agricultural progress, and conduct the ideological and political teaching of plant physiology in a "dual mode" by incorporating these events.

5. Conclusions

The undergraduate course is the core of higher education. Under the background of new agricultural construction, this paper explores the practical scheme of integrating ideological and political education into the plant physiology course and proposes two implementation paths: optimizing teaching principles and improving teaching methods. They not only respect the internal knowledge system of plant physiology but also ensure its internal relations with other disciplines. Meanwhile, we aim to improve teaching methods to diversify them, excavate and penetrate ideological and political elements into the course, integrate modules, and constantly enhance teaching methods in teaching reflection, to lay a solid foundation for the continuous improvement of follow-up courses.

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