

Exploring Ideological and Political Education in the Pharmacology Curriculum and Student Growth: A Case Study of Teaching Artemisinin and Ephedrine in the Context of Building a Leading Country in Education

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Abstract

Against the backdrop of the ongoing efforts to build a leading country in education, higher pharmaceutical education is expected not only to impart professional knowledge and cultivate practical skills, but also to assume the educational mission of shaping values and fostering character development. Based on undergraduate studies in the Pharmacology course, this paper reviews two teaching cases—artemisinin and ephedrine—from a student's perspective. By examining their pharmacological actions, clinical applications, and the history of their discovery and research, we analyze the ideological and political elements embedded in these cases, including cultural confidence, the spirit of scientific inquiry, teamwork, seeking truth from facts, rational drug use, awareness of the rule of law, and social responsibility. Furthermore, drawing on our learning and research training experiences, we reflect on how curriculum-based ideological and political education enhances professional identity, scientific thinking, and a sense of responsibility. On this basis, we propose that ideological and political education in the Pharmacology curriculum should be premised on professional accuracy, delivered through authentic scientific problems and historical materials, and facilitated by student participation and process-oriented assessment, so as to achieve a natural integration of knowledge transmission, ability cultivation, and value guidance.

Keywords

building a leading country in education, pharmacology, curriculum-based ideological and political education, artemisinin, ephedrine, moral integrity and professional competence

1. Introduction

The outline of the Building a Leading Country in Education (2024–2035) Planning states that the fundamental aim of virtue and talent, education of socialist builders and heirs through holistic education in morals, intellect, physical, beauty, and labour education must be carried out, and ideological and political education is considered a key competence to establish a leading country in education and takes the central role [1]. The Principles of Ideological and Political Education in Higher Educational Institutions also suggest that the concept of ideological and political education must be included within the entire system of talent breeding,

using any possibilities of education offered by each course [2]. Thus, ideological and political education is not an extra ideological component to the professional courses but should include the value shaping, knowledge transfer, and skills acquisition components into the real teaching and learning activities and not disturb the natural order of any individual subject.

Pharmacology, as a department that studies the interaction between medicines and the human body and its implications, is the critical link between theoretical medicine and clinical medicine and pharmacy practice. The fact that the discovery, mechanism of action, clinical performance, adverse effects, and rational use of drugs are related to value-based issues is evident and includes the desire to find scientific truth, bioethics, global health, legal norms, and social responsibility. The relevant literature reports that the existing ideological-political education in the field of medical and pharmaceutical education is subjected to criticism due to the failure to incorporate the professional content and ideological-political ones, the selection of examples is too selective, and the means of assessment are cumbersome [3, 4]. A good ideological-political education in the context of the curriculum must be able to allow the student to not just learn how drugs work, at what time it would be safe to administer them and what risks they pose, but also think about why it is essential to study pharmacy, who may take drugs and the type of pharmacist it requires to be.

The examples of artemisinins and ephedrine have been very helpful in my work in this semester in the Pharmacology course. The two are also closely associated with the practice of Chinese medicine but have different educational aspects: the example of artemisinin can be used to illustrate how traditional knowledge and science could be combined, the concerted efforts of one country, and what a country can do to benefit world health. The case of ephedrine is a reminder to young men and women of today that cultural pride should be based on the ability to recognize historical facts and scientific progress and that the effectiveness and danger of drugs should be considered within the framework of legal regulations and obligations. With these two instances as the thread, the given paper will elaborate on the learning experience, personal development, and the reflection on the possible areas of improvement in the curriculum-based ideological and political education in our Pharmacology course.

2. The Educational Logic of Curriculum-Based Ideological and Political Education in Pharmacology in the Context of Building a Leading Country in Education

2.1 From “Identifying Drugs” to “Understanding the Relationship between Drugs and People”

Pharmacology has traditionally been viewed as a memory of large volumes of drugs, drug receptors, indications, and adverse effects of drugs in traditional education. Nonetheless, drugs do not exist as separate chemicals but as components of society, the necessity to research and advance them is based on the desire to remove and cure diseases, they are administered in a medical environment and have something to do with patient safety, they are produced and marketed within the boundaries of legal and regulatory systems, and they are closely connected to equality in healthcare and community health. In turn, the significance of ideology-based and politically biased teaching whose educational curriculum depends on the field of pharmacology cannot be assessed according to the fact that the political categories are added to the knowledge factors, but because it enables the learners to build up the entire sequence of cognition in relation to mechanism-efficacy-risk-responsibility, because the professional and values-based judgements will serve to supplement each other.

2.2 Achieving the Concurrent Advancement of Knowledge, Ability, and Values through Authentic Cases

The use of Artemisinin and ephedrine has clear professional knowledge threads, a rather extensive scientific history background, as well as some obvious practical uses, which is why they can be regarded as acceptable educational models within the context of case-based teaching, problem-oriented learning, and literature reviews. The teachers could raise these questions: What are the risks of using artemisinin as a monotherapy over a long period? What factors can cause ephedrine to produce a fast tolerance? Can the traditional experience be turned into modern evidence? Why must drugs be highly regulated? This is true because it can assist the learners to comprehend the literature retrieval process, comparative analysis of evidence, and clinical scenarios discussion, and will naturally develop the cultural identity, scientific spirit, legal consciousness, and

professional responsibility. Such an integration strategy is more aligned with the need to moisturize things quietly in ideological and political education by using a curriculum, and also prevents disconnection between the ideological and political part and the professional component [4, 5].

3. Artemisinin: Modern Transformation of Traditional Wisdom and Global Health Responsibility

3.1 Professional Knowledge Foundation: Mechanism of Action and Clinical Application

The endoperoxide bridge is the major structural component of artemisinin and its derivatives. It is widely reported that the endoperoxide bridge could be cleaved upon entering the parasite in the presence of ferrous ions or heme, resulting in reactive free radical intermediates that later on alkylate and degrade various parasite proteins and membranes, causing the rapid decline of the number of intraerythrocytic parasites of *Plasmodium*, although the full mechanism of action remains uncertain [6, 7]. This knowledge point will make students remember why scientific evidence is limited since the mechanistic paradigm used in the textbooks is applied to the answer to the question rather than to terminate the questioning.

Artemisinin-based medicine is used clinically and acts very fast but is also cleared quickly by the human body; monotherapy has the tendency to recrudescence and could be a predisposing factor to drug resistance. Therefore, the World Health Organization recommends artemisinin-based combination therapies (ACTs) in uncomplicated falciparum malaria, intravenous artesunate in severe malaria, followed by a complete course of combination therapy when the patient can take oral medicines [8]. In the original draft, the research on the effects of artemisinin derivatives was discussed in the context of anti-inflammatory and immunomodulatory studies as clinical evidence that could be easily mistaken for basic research, possible indicators, and confirmed clinical practice. The updated version concentrates more on the topic of antimalarial treatment and the significance of combination therapy and standardized treatment regimens.

3.2 Ideological and Political Factor 1: Cultural Confidence is not an act of restoration, but a creative transformation

Tu Youyou and her team methodically revisited the ancient medical texts that comprised the project known as Project 523. They based their work on the report written by Ge Hong in his Handbook of Prescriptions for Emergencies, which reported that Ge Hong recommended soaking a handful of qinghao (sweet wormwood) in two sheng of water, squeezing and taking the juice; they experimented with the temperature and solvent in the extraction process until they obtained an ether extract of qinghao that had a consistent antimalarial action on animal malaria parasites. Tu Youyou said when she thought about the process of discovery that the motherload of traditional Chinese medicine gave hints and that modern science and technology helped to identify, isolate, and transform those hints into effective medicines [9].

The procedure described allows students to acquire more cultural confidence. True cultural confidence is not the idea of regarding each of the records in ancient books as an already formulated conclusion or the rejection of the old experience in favor of a new science. On the contrary, it is the ability to identify important clues with an open and questioning mindset and then finish the process of creativity by replicable experiments and methodical evidence. The students of Chinese medicine colleges are not given just to reproduce the classical texts, but also have to make sure that the traditional knowledge can resist the critical review of modern science and regain its power in addressing actual health issues.

3.3 Ideological and Political Element 2: Scientific Spirit, Collective Collaboration, and Institutional Advantages

This discovery of artemisinin is not merely a pointer to the many experiments conducted by Tu Youyou and those working with her, but it also could have been facilitated by the inter-regional, cross-institution, and inter-disciplinary cooperation among those involved in what was known as the Project 523. Jointly, the pharmacy, chemistry, biology, clinical medicine, and other fields developed parallel advances in activity screening, clinical validation, isolation of active principles, structural elucidation, and derivative development.

It could be simple to attribute this kind of accomplishment to a single moment of inspiration or to an individual that randomly managed to do it, but it would belittle the real richness of the history of science.

The given example shows that scientific practice has a minimum of three aspects: (a) the choice of formulating research questions that take into consideration the needs of the nation and its population; (b) the wish to redesign it using evidence whenever repeated failures occur; and (c) the ability to value the contributions of the team members and various fields. The large-scale cooperation of researchers, organized by the state, might have been intended to focus the work on addressing certain acute issues within the sphere of public health, although the benefits of institutionalization cannot be realized due to the practical effects, since every individual researcher makes great efforts to be honest and conscientious in their work.

3.4 Ideological and Political Element 3: A Sense of Global Community for Human Health

The introduction of artemisinin-based drugs has changed the face of malaria treatment globally with the advantages of patients in numerous malaria endemic zones. She was given the Nobel Prize in Physiology or Medicine in 2015 due to her finding artemisinin and its effectiveness against malaria. As officially noted by the Nobel Prize committee, this finding proved to be a very effective tool in the fight against malaria [10]. The conclusion to be drawn is that the Chinese model does not mean isolationism, but once the work done in the field of science in China finds its place in the international scholarly society, is tested in the clinical trials and presented to the people of other countries, it may be seen as an inseparable part of the idea of the globalization of the idea of well-being of humans.

3.5 Student Growth: From Grade-Oriented to Problem-Oriented and Mission-Oriented Learning

Historically, when reading pharmacology, students were accustomed to focusing more on the memorization of conclusions that were needed during examinations. The artemisinin case has motivated numerous students to start asking much more profound questions: Which evidence would a drug require as a starting point in the form of a traditional clue in order to arrive at a clinical regimen? Why has rapid parasite killing not superseded combination therapy? How does one differentiate between lab data, possible applications, and recommendation guidelines? These questions have guided students in realizing that professional education is not intended to repeat stereotypical responses but is designed to enable them to be cautious when dealing with complex evidence.

Talking about undergraduate research studies, students have also redirected their focus towards experimental design, raw data recording, and interpreting results instead of regarding the attainment of positive results as the only measure of success. The failure of an experiment could even be employed to eliminate the wrong directions according to the discovery process of artemisinin, indicating that useful innovations should be able to help in solving the problem of disease prevention and meeting the needs of patients. The objective of the education of modern college students should eventually evolve into more than just the pursuit of personal academic excellence and reach the level of developing the skills of solving practical pharmacy issues so that in the future, they will make their contributions to China's health and world health with a credible professional performance.

4. Ephedrine: Seeking Truth, Dialectics, and Responsibility in Modern Research on Traditional Medicine

4.1 Professional Knowledge Foundation: A Mixed-Action Sympathomimetic Agent

Ephedrine is a sympathomimetic amine, which is a direct agonist of the α - and β -adrenergic receptors, as well as an indirect agonist because of its capability to promote the release of norepinephrine at the terminal of sympathetic nerves. The consequences of these actions are elevated myocardial contractility and cardiac output, peripheral vasoconstriction, and increased blood pressure, dilatation of the bronchi, and excitement of the central nervous system. Ephedrine is similar to epinephrine when given orally, but has a longer effect and is weaker. Repeated dosing can lead to tachyphylaxis through slow depletion of nerve terminal norepinephrine stores [11].

The current usage of ephedrine is limited to some clinical applications, such as the treatment of anesthesia-induced hypotension. It had been used before as a medication to treat asthma and nasal mucosa congestion, but it has dropped dramatically because other drugs are more selective and less toxic. The medicine can have unpleasant side effects such as palpitations, increased blood pressure, insomnia, and dysuria, which is why it is important to pay attention to the indications, dose, and contraindications. In the process of studying pharmacology, an individual needs to consider not only the positive sides of the given sentence, i.e., the excitation of the heart, the increase in blood pressure, and the expansion of the bronchi, but also discuss the possible dangers of such a mechanism to various patients.

4.2 Ideological and Political Element 1: Respect for Historical Facts Strengthens Cultural Confidence

The use of Ephedra (Ma Huang) has been traditionally popular in the medicine of China, but the story of ephedrine cannot be told by one nation or a particular scientist. Based on historical sources, the isolation and identification of ephedrine in ephedra was achieved by the Japanese scientist Nagai Nagayoshi already in the 1880s; by the pharmacologist K.K. Chen and the American physician Carl F. Schmidt, who systematically studied it in the 1920s at Peking Union Medical College and promoted it as a drug, and in 1924, they produced a classic article on the topic: The Effects of Ephedrine, the Active Ingredient in the Chinese Medicine Ma Huang [12, 13].

The first edition might have been somewhat ambiguous in identifying the discovery of ephedrine as an invention of Chinese scientists because it combined the isolation of the active substance, elucidation of its pharmacological qualities, and recommendation of its application in medicine. The suggested correction will preserve the contribution given by Chen but add more background information about the isolation. This editing is also one of the most important factors in ideological and political education based on the curriculum; patriotism should not be built on general and exaggerated stories, and cultural self-confidence should not mean exclusion of the scientific heritage of the globe. Sensitivity to historical information and appropriate distinction between various levels of research are the only ways of truly appreciating the role of Chinese scholars in the emergence of contemporary pharmacology.

4.3 Ideological and Political Element 2: Understanding the Duality of Drugs through Dialectical Thinking

The principle of pharmacological action of ephedrine is that the effects will be determined by the context. Hypotension induced by anesthesia can be considered as positive, although it could be life-threatening in cases where the patient has hypertension or the risk of arrhythmias is high; bronchodilation was once applied to cure asthma as a bronchodilator, but its adverse effects on the central nervous system and cardiovascular system rendered its use unfavorable with time; and the presence of tachyphylaxis after repeated administrations implies that the effects of the drug do not remain constant but depend on neurotransmitter levels and time of administration.

The same type of analysis will turn dialectical thinking into a specific version of logical clinical use of drugs. The indications and contraindications, effectiveness, and side effects, benefit to an individual and threat to a society must be evaluated at the same time by the pharmacist. They ought not to have the notion that a drug might be considered safe simply on the grounds of its natural plant nature or that its therapeutic value can be ignored simply because it is linked with risk.

4.4 Ideological and Political Element 3: Awareness of the Rule of Law and Professional Ethics in Pharmacy

It is evident that substances based on ephedrine have medicinal value, but they can also be used illegally. In the Measures on the Administration of Pharmaceutical Precursor Chemicals in China, ephedrine, pseudoephedrine, and other related agents are considered as pharmaceutical precursors, and it is suggested that they should be tightly regulated in their manufacture, supply, and purchase [14]. This regulatory framework means that, as a pharmaceutical practitioner, it is important to be skilled in drug manufacturing, testing, and distribution, but conscious of what your duties are in relation to drug control and the well-being of society.

Pharmacy professional ethics could also be seen through small aspects, such as proper documentation and storage of records, regulation of raw materials and preparations based on regulations, informing patients about the risks, and rejection of irrational requests. Without comprehending the boundaries of rules and morality, professional competence can be misused, so the ideology and politics of the curriculum should integrate with the legal education and moral values and their implementation into the specifics of working with drugs.

4.5 Student Growth: From “Memorizing Effects” to “Making Responsible Judgments”

The research on ephedrine also enabled students to acquire a more practical insight into the rational use of drugs in the field of pharmacology. Previously, it was noted that students had separate knowledge in the form of lists of receptors-effects-indications; they are now beginning to inquire: What other diseases has the patient been diagnosed with? Is it the right route and dose? What is the effect of repeating the administration? Could you mention some regulators and risks to society? Such thinking can assist students in becoming active consumers of information rather than passive learners of pharmacy who are concerned about the potential risks involved.

As the paper by K. K. Chen et al. also shows, the current studies on traditional Chinese medicine are not merely the procedure of translation of traditional impacts into the modern language, but represent a set of procedures such as isolation of parts, their confirmation of effectiveness, studying the mechanisms, clinical observations, and assessment of safety. The students of Chinese pharmacy who study at Chinese medical institutions have to follow the rules of evidence and be friendly with the tradition and support the progress and creativity of traditional Chinese medicine in a liberal, collaborative, and rigid manner.

5. Insights from the Two Cases for Students’ Comprehensive Growth

Although the teaching resources available on artemisinin and ephedrine are different, they can be logically related to professional practice, science history, and practical responsibility. This connection can be illustrated by the following overview of the threads of knowledge, ideological and political aspects of the students' development, offered as an example based on both cases:

Table 1: Mapping of “Professional Knowledge—Ideological and Political Elements—Student Growth” for the Artemisinin and Ephedrine Cases/

Case	Professional Knowledge Thread	Main Ideological and Political Elements	Impact on Student Growth
Artemisinin	Endoperoxide bridge activation, rapid antimalarial action, combination therapy, and resistance prevention/control	Cultural confidence, spirit of innovation, teamwork, national mission, global health responsibility	The memorization of the results in its pure form should be replaced by the evidence chain thinking; the focus on grades should be replaced by clinical problems and the needs of the population health
Ephedrine	Mixed-acting sympathomimetic effects, tachyphylaxis, indications, and risks	The search for truth in facts, dialectical thinking, collaboration with other states, rational drug consumption, knowledge of the rule of law, and the role of morality in the profession	Instead of using mechanical memorization, use the individualized risk assessment, increased knowledge of regulatory management, and social responsibility

5.1 Professional Identity: Understanding the Public Value of Pharmaceutical Work

These two examples illustrate that the field of pharmacy does not just mean the science that exists in laboratories and medications but also it has expanded beyond the scope of prevention and treatment of diseases, clinical decision making, drug management, and health care of the people. The artemisinin case demonstrates the way in which a pharmaceutical innovation could react to a significant demand in a global disease; the ephedrine case can be used as a lesson that mismanagement of drugs can put patients at risk and even cause harm to the population. Professional identity is thus not based on such a form of interest in high technology, but rather on a strong conviction of responsibility for the safety of patients and the needs of the health care system in the country.

5.2 Scientific Thinking: Seeking Truth with Confidence, Respecting Boundaries with Innovation

The course made the pupils more sensitive to the amount of evidence that can be used and to the degree of conclusions that can be drawn, as well as the historical facts. When talking about artemisinin, it is important to separate its renowned anti-malaria activity and other pharmacological activities, which are currently under investigation; when discussing ephedrine, it is important to differentiate between its traditional use, the separation of the component, pharmacologic interpretation, and medical promotion of the drug. The scientific spirit also means not just the ability to create but also the understanding of what is unknown, confessing mistakes, and avoiding exaggeration.

5.3 Conscious Action: Translating Value Identification into Learning and Research Practices

The ideological and political education that is curriculum-oriented should finally be demonstrated by the behaviors of students such as citing literature by referring to their original sources, performing observations by conducting experiments, distinguishing between facts and conjectures in discussing results, stating the reasons behind them instead of concentrating only on the particular outcomes of failure, and at the same time, keeping in mind the rules, contraindications, and individual-specific peculiarities of a patient when studying the clinical administration of drugs. It is only in the framework of incorporating rigor, honesty, cooperation, and responsibility into the normal practice of learning that one can attain the actual success of moral integrity and professional competence as well as harmony with the subsequent progress of the medical and pharmaceutical operations in the country.

6. Reflections on Further Development of Curriculum-Based Ideological and Political Education in Undergraduate Pharmacology

6.1 Upholding Professional Accuracy and Avoiding Superimposing Ideological and Political Elements over Scientific Facts

The initial step of curriculum-based ideological and political education is professional assessment. In selecting a case in the history of science, the teacher ought to consult the original articles, authoritative textbooks, guidelines, and official historical resources and specify precisely what the terms of discovery, isolation, elucidation of action, and clinical application are. The introduction of new drugs forces us to differentiate between in vitro studies, animal experiments, clinical trials, and guideline recommendations. Value guidance may only be considered reliable in cases where information is precise. Ephedrine history story and careful wording about non-antimalarial use of artemisinin are also cases that support the fact that professional truth-seeking is the most valuable type of ideological and political education.

6.2 Using Questions as Drivers to Achieve Natural Integration Rather than Slogan-Piling

Clinical and research dilemmas could serve as the beginning of questions: Why should artemisinin be combined with other drugs? What is the effect of tachyphylaxis on ephedrine dosage? Does natural origin necessarily equal complete safety? What can be done to transform traditional experience into modern evidence? Such questions are fundamentally professional and value-laden. The investigation of mechanisms, comparison of materials, and proposing solutions contribute to the development of scientific spirit, a sense of life, and responsibility in students.

6.3 Increasing Student Participation and Establishing an Observable Process-Oriented Assessment

As per the curriculum, there ought to be an ideological and political education that cannot be delivered through mere lectures by the instructors. The task given to the students should involve returning to the original literature, developing timelines of the discovery of drugs, comparing package inserts and directions, discussing cases, or writing a reflective journal. Assessment criteria might be authenticity of information, logical thinking, teamwork, scholastic integrity, and risk awareness. The effectiveness of the curriculum-based ideological and

political education has also been suggested to be assessed in two dimensions in other available research, which are instructor instruction design and student involvement and performance, that is, whether the ideological and political components are linked to professional knowledge, promote learning, and lead to emotional and behavioral change [4].

6.4 Highlighting the Distinctive Characteristics of Chinese Medicine Institutions and Connecting Research, Clinical Practice, and Social Practice

The Chinese medicine organizations have valuable assets such as classical literature, natural drug studies, associated hospitals, and drug manufacturing companies. The pharmacology classes might require linking class examples with literature reviews, laboratory instructions, hospital training, and company employment to allow students to see how the process of drug development is studied both traditionally and currently through experimental findings and clinical judgments, and in terms of effectiveness assessment and quality and regulations. It will only happen when ideological and political education that is curriculum-based can go past classroom knowledge and into the professional practice of life.

7. Conclusion

To become one of the most developed countries in the world in the field of education, it is necessary to have highly qualified talents who are intelligent, very skilled and good. The cases of artemisinin and ephedrine demonstrate the truth that the pharmacology curriculum has numerous ideological and political resources as well as particular ones: the mix of the old wisdom and the new science may be used to develop cultural confidence and innovative awareness; the history of scientific investigation can instruct a person to be truth-seeking, collaborative, and devoted; the drugs' effectiveness and risks can contribute to the development of the individual in the field of dialectical thinking; and the regulation of drugs can increase the sense of the rule of law and professional ethics.

The most remarkable progress of students in ideological and political education according to the course is not more grand phrases but primary understanding of their profession on a mass scale, i.e., they ought to pay attention to the mode of operation of drugs and their authenticity, to the innovation in science and compliance with the standards of ethics and law, and to personal growth as well as to the benefits of the patient, society, and the state that the profession serves. Such awareness must be implemented in all spheres of learning, experimentation, and practice in the future since we aspire to turn into pharmaceutical specialists with high moral standards and professional abilities to meet the demands of our era and respond to changes occurring in our state.

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