

## Article

# Integrating the Spirit of Scientists into Ideological and Political Courses in Colleges and Universities: Value Implication, Realistic Dilemma and Practical Path

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**Abstract:** The scientist spirit represents the precious spiritual wealth accumulated by scientific and technological workers throughout long-term scientific practice, serving as an essential component of the broader spiritual pedigree of the Chinese nation. In contemporary higher education, it is of great significance to integrate the spirit of scientists into the ideological and political courses in colleges and universities. This integration is fundamentally designed to shape the comprehensive scientific literacy of college students, cultivate top-notch innovative talents, and actively practice socialist core values within academic environments. By embedding these principles into the curriculum, educators can foster a deeper appreciation for rigorous inquiry, ethical responsibility, and national dedication among the next generation of scholars. However, there are currently several notable difficulties in the practical process of this educational integration. Primary challenges include the suspension of clear value orientation, the distinct lack of meaningful subject dialogue between scientific disciplines and ideological frameworks, and the virtual transformation of practical application, which often leaves theoretical concepts disconnected from real-world utility. To overcome these systemic barriers, these issues need to be systematically solved by reshaping the foundational value orientation of the curriculum, significantly enhancing interdisciplinary subject dialogue, and strengthening the tangible transformation of educational practice. Ultimately, establishing a robust framework for this integration will ensure that the enduring spirit of scientific inquiry effectively empowers students, thereby contributing to the sustainable advancement of both the educational system and broader societal development.

**Keywords:** scientist spirit; higher education; ideological education; scientific literacy; educational integration

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## 1. Introduction

The power of spirit has a decisive influence on the growth of individuals and the development of the country [1]. In 2019, the General Office of the Central Committee of the Communist Party of China and the General Office of the State Council jointly issued the Opinions on Further Promoting the Spirit of Scientists and Strengthening the Construction of Style of Work and Style of Study, and clearly put forward six core elements of the spirit of scientists: patriotism, innovation, truth-seeking, dedication, coordination, and education. In 2021, the spirit of scientists was formally incorporated into the spiritual pedigree of the Chinese Communists, which marked the country's high attention and affirmation of the spirit of scientists.

In the grand journey of realizing the great rejuvenation of the Chinese nation, college students, as the main force to promote the process of Chinese-style modernization, have a spiritual outlook that is directly related to the future of the country. Therefore, in response to the call of the state to carry forward and inherit the spirit of scientists, it is essential to deeply explore the value of the spirit of scientists in the ideological and

political courses of colleges and universities. Utilizing the spirit of scientists to optimize the ideological and political education of college students has become an important approach for colleges and universities to address the challenge of talent cultivation, fulfill their responsibility in nurturing talent, and achieve the strategic goal of strengthening the country through science and technology.

## **2. Connotative Characteristics of the Spirit of Scientists**

### *2.1. Patriotism and Dedication Are the Original Mission of the Spirit of Scientists.*

Patriotism is the soul and essence of the spirit of scientists. Patriotism has always been the most distinctive background of the Chinese nation from ancient times to the present, and it is a powerful spiritual force of the Chinese nation. In the new era, patriotism has become the deep connotation of the ideals and beliefs of contemporary scientists. Scientists have always closely integrated their personal academic pursuits with national development, from manned spaceflight to quantum communication, from high-speed railway to Beidou navigation, from chip technology to new energy research and development [2]. Whether in basic research or applied technology, scientists have always maintained a strong sense of mission and responsibility, contributing the most valuable force to the great rejuvenation of the Chinese nation.

Dedication is the core value of the spirit of scientists. Scientists are willing to sit on the 'cold bench,' regardless of personal gains and losses, do not pursue short-term interests, have a long-term and persistent mind, and write magnificent poems on the rejuvenation of the Chinese nation with the mindset of 'success does not have to be in me.' It profoundly interprets the firm oath of 'the country needs, I will struggle,' and integrates personal ideals into the grand narrative of national rejuvenation. On the journey of scientific research, they use wisdom and sweat to provide strong scientific and technological support for the realization of the great rejuvenation of the Chinese nation [3].

### *2.2. Innovation and Collaboration Are the Backbone of the Spirit of Scientists.*

Innovation is the essence of the spirit of scientists. As the core engine of scientific and technological progress and social development, innovation is the eternal driving force for the prosperity of a country. Scientists are keen to forge ahead, always maintaining an awe of the unknown and an enthusiasm for exploration, with a rigorous scientific attitude and open innovative thinking. They constantly break through new heights in scientific and technological development, showcasing the surging power of China's scientific and technological innovation [4].

Synergy is a distinctive feature of the spirit of scientists. A new round of scientific and technological revolution and industrial transformation is developing in depth and updating rapidly. The organizational model of scientific research is also undergoing drastic changes. The power of a single discipline has become insufficient to address major global scientific challenges. Interdisciplinary and cross-disciplinary collaboration has emerged as a key path to solving scientific problems [4]. Scientists have demonstrated unity and cooperation, working together to overcome a series of key technologies and achieve a qualitative leap in China's scientific research capabilities.

### *2.3. Seeking Truth and Educating People Is the Noble Pursuit of the Spirit of Scientists.*

Truth-seeking is the rational endowment of the spirit of scientists. Science is no small matter; it requires refinement, and scientific research experiments of all sizes must avoid errors. A minor mistake can lead to significant consequences, as even the smallest details may trigger a chain reaction resulting in substantial losses. Scientists consistently maintain their desire for knowledge and exploration of truth, adhering to the principles of bold assumptions, careful verification, and a pragmatic, step-by-step approach to study. They uphold a meticulous research style that leaves no detail unchecked, thereby driving the continuous advancement of China's science and technology.

Education is the enduring force behind the spirit of scientists. Science is a shared endeavor of humanity, not an isolated process fragmented into parts, but a historical

journey to understand and explore the essence of nature. It requires individuals to connect the past with the future, addressing the challenges of the times and striving forward in the ongoing flow of history [5]. Scientists demonstrate selfless dedication, acting as mentors to train successive generations of scientific and technological talent. This ensures the sustainable development of science and technology for the nation, fostering progress across generations.

### **3. The Value Implication of Integrating the Spirit of Scientists into the Ideological and Political Courses in Colleges and Universities**

Behind scientific achievements, there is often a profound spiritual foundation. As the spiritual wealth accumulated by scientists and scientific and technological workers in long-term scientific practice, the spirit of scientists not only provides a strong spiritual impetus for the sustainable and healthy development of science and technology, but also points out the direction for the growth and success of college students in the new era. On the new journey to achieving broader developmental goals, integrating the spirit of scientists into the ideological and political courses in colleges and universities is not only the inheritance and promotion of the scientific spirit, but also the deep nourishment and shaping of the all-round development of college students.

#### *3.1. The Meaning of Practicing the Socialist Core Values*

The socialist core values are the concentrated embodiment of the spirit of contemporary China. They represent the common value pursuit and ideals and beliefs of all the people. The qualities of patriotism and dedication inherent in the spirit of scientists align closely with the concepts of patriotism and dedication within the core values of socialism. This serves as a vivid representation of these values in the field of science and technology. Integrating the spirit of scientists into ideological and political courses in colleges and universities is not only a process of imparting scientific knowledge to students but also a profound means of value guidance and spiritual development. This approach helps guide students to align their personal aspirations with the broader goals of national development, transforming their patriotism, ambition for national strength, and commitment to serving the country into practical actions. It also contributes to cultivating talents for the new journey of building a strong nation.

#### *3.2. Objective Requirements of Cultivating Top-Notch Innovative Talents*

Innovation is an important engine to promote the progress and development of modern society [6]. Innovation is a key factor in promoting change in various fields such as science, technology, economy, and culture. Talent is the primary resource for driving innovation in the domains of knowledge, science, technology, industry, and economy. As the backbone of the country's future development, college students in the new era shoulder the historical mission of advancing national scientific and technological progress and innovation. The innovative spirit and collaborative consciousness embedded in the essence of scientific endeavors are vital for cultivating top-notch innovative talents. Integrating the spirit of scientific inquiry into ideological and political courses in colleges and universities helps shape college students' lofty scientific ideals, unwavering research perseverance, acute problem-solving awareness, and a strong sense of unity and cooperation. This approach establishes a solid ideological foundation and provides essential spiritual support for nurturing top-tier innovative talents with international competitiveness.

#### *3.3. The Realistic Needs of Shaping the Scientific Literacy of College Students in the New Era*

In the era of the knowledge economy, scientific literacy has become a crucial indicator of individual comprehensive quality and competitiveness. Scientific knowledge forms the foundation of scientific literacy and serves as a prerequisite for college students to adapt to the complex demands of future society. However, the study of scientific knowledge should not be limited to theoretical mastery; it must also be applied to practical problems to understand its significance from a dynamic developmental perspective. The spirit of

scientists emphasizes seeking truth and pragmatism, advocating for the unremitting pursuit of facts and truth. Integrating this spirit into ideological and political courses can guide college students to develop a rigorous academic attitude, cultivate realistic and pragmatic academic habits, and foster practical consciousness. Furthermore, the enhancement of scientific literacy is inseparable from adopting scientific ways of thinking and research methods. The scientific thinking, methods, and spirit embodied in the ethos of scientists are key factors in improving the scientific literacy of college students. Incorporating these elements into the ideological and political curriculum in colleges and universities holds significant value for advancing the scientific literacy of students.

#### **4. The Realistic Dilemma of Integrating the Spirit of Scientists into the Ideological and Political Courses in Colleges and Universities**

As the core value framework for cultivating scientific and technological innovation talents in the new era, the spirit of scientists serves as a valuable teaching resource for colleges and universities in conducting ideological and political education. Currently, the challenges of integrating the spirit of scientists into the teaching of ideological and political courses in colleges and universities stem from a disconnection in value orientation, insufficient dialogue between subjects, and a superficial transformation of practical applications [7-10].

##### *4.1. Value-Oriented Symbol Suspension: The Tension Imbalance between Ideological Narrative and Instrumental Rationality*

As an important carrier of national scientific and technological ethics discourse, the value-leading function of the spirit of scientists should ideally facilitate ideological reproduction through the construction of a "collective will." However, at the practical level, the value symbol of the spirit of scientists often encounters a "suspension crisis." According to cultural leadership theory, the legitimacy of ideology must be internalized through the complete chain of "knowledge-value-practice." In the current teaching of ideological and political courses in some colleges and universities, the spirit of scientists is frequently reduced to a one-dimensional narrative of "patriotic dedication," which fragments the comprehensive value framework of "pursuing truth, rigorous scholarship, collective wisdom in tackling key problems, and nurturing future scholars." The dimensions of "innovation" and "seeking truth" emphasized in official guidelines are often narrowed into mere knowledge transfer, turning the spirit of scientists into a "successful learning case base." This instrumental rationality-oriented teaching design creates a practical gap between the spirit of scientists and the requirement to "carry forward the scientific spirit" as outlined in national moral construction initiatives [9]. Consequently, its role as a discourse carrier for national science and technology ethics is weakened, leading to a dilemma of "value hollowing."

##### *4.2. The Lack of Inter-Subjective Dialogue: The Double Obstruction of Discourse Transformation and Value Cohesion*

The cultivation of the spirit of scientists is fundamentally a two-way interactive process involving the transmission of values and the construction of meaning. However, current teaching practices face two significant challenges. First, there is a dilemma in transforming professional discourse into the context of everyday life. The highly specialized nature of the spirit of scientists and the diverse backgrounds of students in ideological and political courses create tension [10]. In teaching, the spiritual essence is often oversimplified into 'great man stories,' and the lack of deeper exploration into scientific ethics and critical thinking results in cognitive alienation among students. Second, the connection between traditional values and modern ideals has been disrupted. Influenced by utilitarianism and consumer culture, some students misinterpret the spirit of scientists as 'outdated idealism' and fail to establish meaningful links between this spirit and practical concerns such as career planning and social responsibility. This dual disconnect between discourse systems and value contexts hinders students from bridging

intergenerational cultural gaps and addressing the contemporary challenge of fostering humanistic values in the era of science and technology.

#### *4.3. The Field Virtualization of Practice Transformation: The Efficiency Dilemma of Embodied Cognition and Institutional Disembedding*

The goal of cultivating the spirit of scientists is to achieve the closed-loop transformation of "cognitive identity-value internalization-behavioral consciousness," but current ideological and political teaching practices exhibit a "separation of knowledge and practice." The theory of communicative action emphasizes that value identity must be constructed in the life world through intersubjective dialogue. However, the traditional one-way indoctrination model of "theoretical preaching + case filling" creates an intergenerational conflict with the cognitive process of "scene immersion-emotional drive-embodied participation" characteristic of Generation Z students. The concept of "unity of knowledge and action" advocated by "China Education Modernization 2035" has been reduced to a formalistic process of "exhibition hall observation + experience writing" in the practice of ideological and political teaching. Students can only "experience" the spirit of scientists in virtual simulation laboratories but cannot engage in "brainstorming" within them. The dislocation between habitus and field inevitably leads to a rupture in action logic, causing the cultivation of the spirit of scientists to fall into a vicious cycle of "shallow cognition-value suspension-inaction." This ultimately reduces the education on the spirit of scientists to symbolic performance, thereby undermining its educational significance in ideological and political courses [9].

### **5. The Practical Path of Integrating the Spirit of Scientists into the Ideological and Political Courses in Colleges and Universities**

The theory of cultural leadership emphasizes that the legitimacy of ideology must be internalized through the complete chain of 'knowledge-value-practice.' Addressing issues such as the suspension of value orientation, the lack of subject dialogue, and the virtual transformation of practice in the current integration of the spirit of scientists into ideological and political courses in colleges and universities requires reconstructing the meaning-generation mechanism of scientists' spiritual education. This approach should promote its transformation from symbolic narration to life practice, guided by the logic of 'consensus production' inherent in cultural leadership theory.

#### *5.1. Reshaping the Value Orientation Based on the ' Knowledge-Value ' Association*

The value suspension of the scientists' spirit arises from the imbalance between ideological narratives and instrumental rationality, leading to a disconnection in the 'knowledge-value' chain. To address this issue, it is essential to focus on the bidirectional interaction between knowledge dissemination and value interpretation.

First, the knowledge dimension of the scientists' spirit should be expanded. The teaching of ideological and political courses must move beyond a one-dimensional narrative of "patriotic dedication" and systematically outline a comprehensive value framework, including "pursuing truth, rigorous scholarship, gathering wisdom to tackle key problems, and mentoring future generations." By analyzing pivotal events in the scientific research process, the abstract concept of the scientists' spirit can be transformed into a tangible knowledge framework. This approach enables students to grasp the internal logic of the scientists' spirit, fostering a comprehensive and profound understanding.

Second, the value integration within knowledge transfer must be strengthened. Building on existing guidelines for promoting the scientists' spirit and enhancing academic and professional conduct, educators should deeply explore the value implications embedded within the scientists' spirit. These values should be closely aligned with broader frameworks for moral development, guiding students to recognize that the scientists' spirit is not only a treasure within the scientific and technological domain but also a vital component of a modern moral system. This approach ensures that students acquire knowledge while appreciating the value-driven role of the scientists' spirit. By

intertwining knowledge transfer with value shaping, the risk of "value hollowing out" is mitigated, allowing the scientists' spirit to resonate deeply with students. This integration helps embed the scientists' spirit into students' perspectives, establishing it as a guiding value throughout their personal and professional growth.

### *5.2. Enhance the Subject Dialogue by ' Value-Practice ' Interaction*

The lack of subject dialogue essentially represents a disconnect between the spirit of scientists and the life world, making it challenging for students to establish meaningful connections between their personal experiences and value identity. To address this, it is crucial to foster a deep integration of the spirit of scientists with the life world of students through a two-way interaction of 'value-practice.'

First, educators should adapt their discourse methods to align with the characteristics and needs of students across different disciplines. For science and engineering students, integrating cutting-edge scientific research achievements from their fields can help illustrate the specific manifestations of the spirit of scientists. For liberal arts students, educators can highlight how the spirit of scientists contributes to societal progress and cultural enrichment, emphasizing perspectives such as social development and cultural heritage. By tailoring discourse to suit disciplinary contexts, cognitive barriers can be eliminated, embedding the spirit of scientists within the meaning framework of diverse student groups.

Secondly, addressing students' misconceptions about the spirit of scientists, which may arise due to the influence of utilitarianism and consumer culture, requires bridging the gap between this spirit and practical issues through ideological and political education. For example, organizing students to participate in social practice projects can encourage them to reflect on how the spirit of scientists contributes to solving real-world problems and aligns with their career aspirations to uphold social responsibility. This approach fosters the humanistic spirit of the technological era, bridges intergenerational cultural divides, and ensures the effective inheritance and value construction of the spirit of scientists among contemporary students.

### *5.3. Strengthen the Transformation of Practice with ' Practice-Knowledge ' Feedback.*

The blurring of the practice field reflects the institutional disembedding of the 'knowledge-value-practice' chain. It is essential to promote the transformation of the scientist's spirit into habitual behaviors through embodied practice.

First, create an immersive practice environment. By focusing on the cognitive characteristics of 'scene immersion-emotional drive-embodied participation' among Generation Z college students, this study proposes a 'Scientist Spirit Embodied Chemical Workshop.' This workshop simulates the key research processes of major scientific projects, encouraging students to collaborate in groups and personally experience the essence of the scientist's spirit through activities such as brainstorming. After the practice, students engage in in-depth reflection and discussion, transforming their emotional experiences and behavioral insights into a deeper understanding of the scientist's spirit. This process fosters a positive feedback loop of 'practice-knowledge,' enhancing their comprehension and appreciation of the scientist's spirit.

Secondly, guided by the practical education principles outlined in modernization frameworks, and adhering to the concept of 'unity of knowledge and practice,' it is crucial to establish and refine a robust ideological and political practice support system. From the planning and organization to the evaluation of practical activities, comprehensive institutional support is necessary to ensure these activities transcend superficial formats such as 'exhibition hall observation and experience writing.' Instead, they should serve as effective mechanisms for students to internalize the scientist's spirit into conscious behaviors. Through continuous and systematic practical activities, students can achieve a closed-loop transformation of 'cognitive identity-value internalization-behavior consciousness' within the iterative feedback of practice and knowledge. This approach significantly enhances the educational impact of ideological and political courses in fostering the scientist's spirit.

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