

Innovation of the Development Path of Higher Education Based on the Concept of “Integration of Science and Education and Interdependence of Speculation”

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Keywords: Integration of science and education, Speculative interdependence, College education, Innovation

Abstract: The integration of science and education is an important core concept that high-level universities around the world have long adhered to and followed, and it is also an inevitable choice for higher education to achieve high-quality development in the new development stage. Teaching and scientific research are the two wings to promote the development of universities and the two pillars of talent training in universities. Only by combining the two organically can we create a good educational environment and improve the ability of universities to serve the society. The survey shows that at present, there is an imbalance or even opposition between teaching and scientific research in universities in China, which is extremely detrimental to the development of schools. Therefore, we should establish and improve relevant systems and regulations to achieve the integration and construction of scientific research and teaching. This paper puts forward an innovative strategy for the development of higher education based on the concept of “integration of science and education, speculative interdependence” to improve the quality of higher education.

1. Introduction

Universities are an important combination point of science and technology and economy, as well as a natural combination point of science and technology and education^[1]. In universities, science and technology, education, economy and culture should not only and fully integrate with each other and develop in coordination^[2]. Therefore, it has become one of the most core topics in the field of higher education in recent years to comprehensively promote the reform of the scientific and technological system that encourages innovation in higher education institutions, and at the same time to provide a sufficient number and quality of innovative talents for the future innovation driven development society^[3]. To improve the quality of higher education in an all-round way, we must strengthen our scientific research ability. Because higher education is different from compulsory education, modern higher education is not a simple knowledge inheritance. It must focus on the cultivation of ability and quality, give play to the educational function of scientific research, and highlight the cultivation of students' scientific spirit, creative thinking and scientific research ability^[4]. Universities must start from their own actual conditions and seek truth from facts to find and solve problems^[5]. According to the goals and instructions of the national higher education reform and development, we will deeply analyze our own shortcomings and shortcomings, compare our own advantages and characteristics, and clarify the goals and positioning of the development concept. On this basis, we will highlight the key points and characteristics of teaching development, emphasize the innovation of discipline design methods, so as to comprehensively plan and optimize various resources in the school, and promote the further development of science and education integration in the school^[6].

2. Science and Education Integration and College Teaching

2.1 The Concept of “Integration of Science and Education, Interdependence of Speculation”

The concept of integration of science and education is mainly embodied in scientific research

oriented teaching and teaching integrated research, with the ultimate goal of promoting the quality of talent training^[7]. In a broad sense, science and education integration is the combination of science and technology and education, promoting science with education, leading education with science, and forming a situation of coordinated development. The narrow sense of science and education integration refers to the emphasis on combining education with research. The implementation of the internal mechanism of science and education integration (Figure 1) not only refers to the addition of scientific research elements in the classroom, but also emphasizes the role of teachers in inspiring and guiding students in the teaching process. Speculation is a movement, often compared with practice^[8]. In practice, there is a difference in time between the active side and the passive side. It doesn't happen at the same time. The active party and the passive party in the speculation are united in time^[9]. Thinking and thinking happen at the same time. Speculators often ask questions to better understand and solve problems more effectively^[10]. Therefore, the cultivation of critical thinking ability can enable students to enter the state of academic research as soon as possible and obtain more and better research results. The concept of “integration of science and education, interdependence of speculation” provides a strong theoretical support for the innovation and development of higher education^[11].

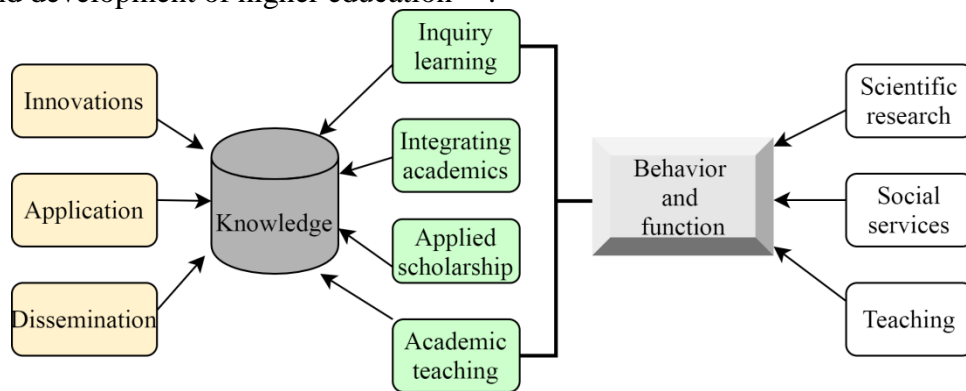


Fig.1 The Internal Mechanism of the Integration of Science and Education

Scientific research and education are two sets of carriages that drive knowledge production and reproduction. They have brought a strong driving force for economic and social development. At the same time, the disadvantages of “separation of science and education” have become increasingly apparent. How to make the two engines tune with each other and output the strongest resultant force is an issue of the times. Focus on the integrity and hierarchy in the realization of the concept of “science and education integration”: including the basic level with the core feature of teaching reform around high-level scientific research, the advanced level with the core feature of school management process and system reform, and the highest level with the core feature of school development strategy and cultural reform. The “integration of science and education” has truly become the new normal of university running.

With the explosive growth of new knowledge and the rapid development of educational technology, the habit of learning knowledge and the cognitive way of things have undergone fundamental changes. The connotation of education has rushed out of the campus and classroom, and new educational ideas and concepts across time and space are taking shape. In order to improve the innovative ability and cultivate innovative talents, universities must first break through the traditional narrow understanding of teaching and scientific research, mobilize and inspire teachers and students' thirst for knowledge and spirit of exploration, and seek the truth in a more natural academic environment. By setting up publicity platforms including academic lectures, introduction meetings of subject competitions, etc., students can get a preliminary understanding of the basic knowledge of scientific research. By setting up practice platforms including participation in scientific research projects and problem-based teaching courses, students' fear of difficulties in scientific research activities can be broken, so that students can master the basic research paradigm and research methods of scientific research activities in practice and cultivate their scientific research spirit.

2.2 The Current Situation of Teaching Development

University is the center of knowledge inheritance and creation. Creation is accomplished through “scientific research”, and the process of creation is also a process of communication. In the process of innovation, people’s understanding of the relationship between talent training and teacher resources has also improved with the progress of science and technology. However, at present, some universities and educators still regard the simple “knowledge impartation” as the main standard to measure education, and do not fully understand the relationship between scientific research and innovation and the improvement of education quality, and do not really realize the importance of “science and education integration”. In particular, undergraduate teaching is still dominated by “traditional indoctrination” and “unilateral teaching by teachers” classes. The integration of scientific research into the classroom is poor, and students have less experience in participating in scientific research training. The current teaching method does not meet the needs of science and education integration and talent training. The development of practical and interactive teaching is insufficient. Emphasis is placed on knowledge learning rather than exploratory learning.

In addition, the current talent training model of science and education integration is difficult to meet the needs of regional development. Restricted by factors such as students, teachers, ideas and systems, and still affected by traditional talent training mode in specific practice, there are some problems such as the solidification of the training mode and the difficulty in stimulating students’ subjective initiative in learning. At the social level, the current publicity of the concept of science and education integration is not strong enough, and the relevant documents, systems, campus environment and classroom learning atmosphere have not yet thoroughly implemented the concept, resulting in the lack of channels for students to understand the concept of science and education integration, and not fully understand the concept of science and education integration.

3. Specific Strategies for the Integration Mechanism of Science and Education in Colleges and Universities

To improve the quality of higher education in an all-round way, we must solve the problem of how to renew ideas and mechanisms. Constantly enrich and expand the channels and resources of talent training in universities, and promote the integration of scientific research into higher education and talent training in universities. Let universities become the intersection of knowledge innovation and inheritance, realize the effective interaction between scientific research and teaching, form a good situation in which high-level scientific research supports the cultivation of high-quality talents, and gradually construct a science-education integration system and system in which scientific research guides teaching and learning. To this end, we can discuss it from the following direct and indirect angles. The direct aspect refers to the cultivation of talents, and the indirect aspect refers to the assistance of the society, government, schools and other participating subjects.

The talent training mode of science and education integration is an endogenous mode, which means that scientific research practice activities are embedded into the whole teaching process, mainly reflected in classroom research and learning and participation in scientific research training (Figure 2). (1) Research learning. Combine classroom research learning with scientific research training, and introduce scientific research achievements into classroom teaching. Carry out teaching closely around the frontier of scientific research development, so that students can fully grasp the methods and technical routes of academic paper creation. Introduce special research training into classroom teaching, so that students can master professional knowledge in the process of completing the project. (2) Participate in scientific research training. Students are encouraged to master research ideas and methods through full participation in scientific research under the guidance of teachers. Guide students to expand their academic horizons through academic exchanges and interactions.

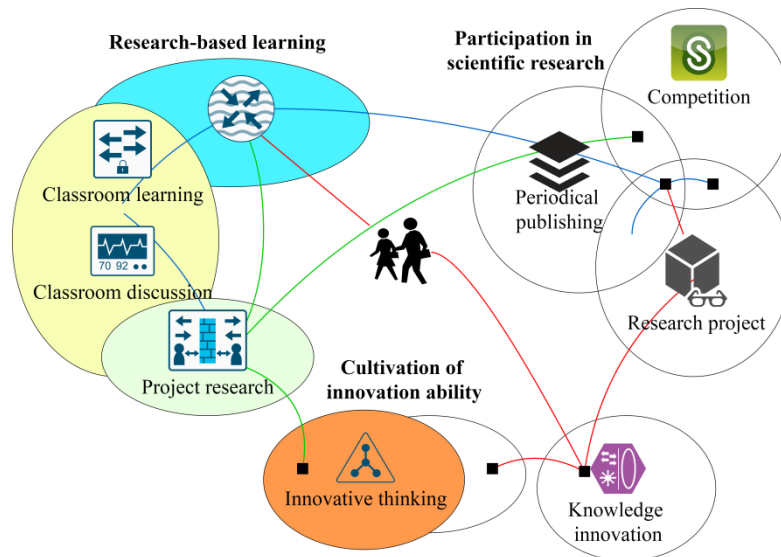


Fig.2 Cultivation of Talents in Universities Integrating Science and Education

From the indirect point of view, we can start with the following specific points:

(1) The government should increase the financial investment and policy preference for the cultivation of talents integrating science and education through the support of the policy environment. Secondly, build a collaborative education platform between schools and schools, schools and scientific research institutions, and schools and enterprises, and give certain encouragement and support to the subjects participating in the collaborative training.

(2) In the process of serving the needs of the country, society and industry with scientific and technological innovation, the school actively advocates integration of science and education, integration of production and education, and promotes teachers to constantly update knowledge, master the frontiers of disciplines, and innovate education and teaching methods. Introduce the latest ideological and theoretical methods and knowledge into classroom teaching, transform high-quality scientific research resources into educational resources and advantages, and transform advanced scientific research facilities into teaching innovation platforms. Lead students to participate in discussion and free inquiry learning, and fully mobilize learning enthusiasm and subjective initiative. On the premise of ensuring the normal teaching order and being responsible for the teaching quality, universities must give teachers more independent choices in teaching, so that teachers can use their brains on academic issues of their own concern. At the same time, college teaching must give students more space for independent learning, and more fully reflect the school running concept of “lifelong learning and student-centered”.

(3) Establish the system and mechanism of undergraduates' participation in scientific research, so as to truly realize teaching and learning. It not only promotes the continuous improvement of teachers' academic level and teaching ability, but also cultivates students' innovative thinking and interdisciplinary knowledge structure in the process of “scientific research-teaching-learning”, forming an academic community between teachers and students.

(4) Build a research university characterized by the integration of science and education. We should not only base ourselves on construction, but also make use of digital conditions and VR, AR and other technologies to introduce the laboratory conditions of national research institutes and on-site teaching and research scenes including various national conditions research bases into the campus, so that students can get an immersive teaching and research experience.

4. Conclusions

We should be soberly aware that there are still many problems and obstacles in the current work of science and education integration and collaborative innovation in universities, some of which are conceptual and some of which are institutional. To completely solve these problems, we need supporting policies and measures, and more importantly, we need to solve conceptual and cognitive

problems. The implementation of the concept of “science and education integration” is far from being limited to students' classrooms, departments' laboratories and individual management departments. Without the support of the comprehensive reform plan at the overall level of the school, “science and education integration” will become a water without a source and a tree without roots. To comprehensively improve the quality of talent training, we must establish a new form of modern university system that integrates science and education. This is not something we can understand with the past higher education theory and talent training system. The formation of the concept of science and education integration, like the development of new disciplines, changes in the external environment often make two or more disciplines that originally thought there was no connection achieve perfect integration, forming a completely unexpected new form.

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