

# Research on the Talent Cultivation Mode of Applied University Based on the Integration of Science and Education

Shuqin Li

North China University of Technology, Beijing, 100144, China

## Abstract

Application-oriented colleges and universities are an important part of the national scientific and technological strength and an important force for the construction of an innovative country. They have multiple functions such as talent cultivation, scientific research, social service and cultural inheritance. The integration of science and education is an important mode for application-oriented colleges and universities to cultivate students' application and innovation ability and improve the quality of application-oriented talent cultivation. This paper analyzes the significance and existing problems of the integration of science and education in application-oriented colleges and universities, and puts forward suggestions on the implementation of the talent training mode of the integration of science and education in application-oriented colleges and universities, in order to provide references for the implementation of the integration of science and education in application-oriented colleges and universities.

## Keywords

Integration of Science and Education, Applied Colleges and Universities, Talent Cultivation.

## 1. Introduction

The concept of science and education integration combines scientific research with teaching and educating people as an effective way of education reform, and promotes the endogenous impetus of colleges and universities and the development of higher education. Application-oriented universities, as an important force for educating talents for the country, shoulder the heavy responsibility of conveying application-oriented talents to the society and the country, and are an organic component of the national scientific and technological strength. They should conscientiously fulfill the mission of integrating science and education, take appropriate measures, give full play to their own advantages and characteristics, continuously strengthen the docking with the national strategic goals, tasks and requirements, and strengthen the integration of innovative resources and capacity building. We will promote the integration of science and education to a new level, cultivate high-quality and innovative talents, and contribute to the modernization of Chinese-style higher education and the building of a world power in science and technology and education.

## 2. Significance of the Integration of Science and Education in Applied Colleges and Universities

### 2.1. Integration of science and education is an effective way to cultivate top-notch innovative talents

The integration of science and education is the core idea of the engineering education model of world-class universities, and it is an effective way to train outstanding and top-notch innovative talents. The concept of integration of science and education originated in Europe and the United

States. For example, the University of Berlin in Humboldt, Germany, regards scientific research as the basic concept of university running, and allows students to participate in the scientific research process of teachers. Universities in the United States, the United Kingdom and other countries have gradually introduced the concept of science and education integration, combining scientific research and talent cultivation to promote education reform and higher education development. The deep integration of science and education has become an inevitable trend of deepening the reform of education and teaching in colleges and universities, which reflects the new direction of the development of colleges and universities in the new era.

## **2.2. Integration of science and education is an inevitable requirement for improving the quality of talent cultivation in application-oriented colleges and universities**

The integration of science and education is a new talent training mode that deeply integrates scientific research with teaching content and teaching form, aiming at cultivating innovative talents. Application-oriented colleges and universities attach great importance to the cultivation of talents' innovative ability and practical ability, and the integration of science and education organically integrates the school-running mode, talent training mode and scientific research organization mode to improve the training quality of application-oriented innovative talents. The digital age requires innovative talents to possess two important qualities: one is professional integrity and responsibility, and the other is to work creatively. To train the above talents, it is necessary to establish a new talent training model based on the concept of integration of science and education, update the teaching concept, restructure the curriculum system, reform the teaching model, cultivate professional talents with the spirit of craftsmanship, enhance the humanistic and scientific literacy of talents, so as to improve the quality of talent training in application-oriented colleges and universities.

## **3. Problems Existing in The Integration of Science and Education in Application-oriented Universities**

The integration of science and education has become an important way for application-oriented colleges and universities to cultivate innovative talents. However, the lack of integration of education, science and technology and talents is the main problem in application-oriented colleges and universities, which is embodied in the following three aspects.

### **3.1. Lack of driving force for the integration of science and education among college teachers**

At present, the fundamental problem restricting the integration of science and education in application-oriented colleges and universities is the lack of driving force of teachers themselves. Due to the weak ability of scientific research innovation and achievement transformation in some application-oriented colleges and universities, the lack of in-depth integration of university and enterprise research teams in colleges and universities, teachers and students rarely participate in the technological research and development of enterprises, and it is difficult for some application-oriented colleges and universities to build Bridges between scientific research institutions and enterprises. As a result, the combination of technological innovation and talent cultivation is not close, the degree of students' participation in scientific research is insufficient, and the education effect of the integration of science and education has not been well played. The main reason for the above problems is the lack of necessary incentive mechanism. The promotion and assessment of professional and technical positions of teachers in most application-oriented colleges and universities still focus on national and provincial projects and high-level academic papers, and take scientific research as the main standard to measure teachers' work performance, which makes it difficult to mobilize teachers' enthusiasm

to participate in teaching reform. Teaching-type teachers have heavy teaching tasks, lack of time and energy for scientific research, single teaching content and lagging teaching resources, thus restricting the development of the integration of science and education. Although the professional knowledge of the research-oriented teachers is more suitable for the actual needs of the society, the teaching experience is relatively insufficient, which leads to the students' inability to resonate with the teaching content, and restricts the effect of the integration of science and education.

### **3.2. Lack of in-depth exploration into the integrated teaching mode of science and education**

The integrated teaching mode of science and education refers to the teaching and research integrated teaching mode which aims at cultivating innovative talents, takes scientific research and teaching activities as the education community, and improves students' innovative thinking and practical ability. At present, the integrated teaching mode of science and education has been carried out in colleges and universities, which is reflected in the following aspects: attaching importance to teaching work in the school-running philosophy, strengthening the proportion of students participating in scientific research in the training system, gradually promoting the integrated teaching mode of science and education, promoting scientific teachers to undertake undergraduate teaching work, and highlighting the proportion of teaching indicators in the professional and technical post promotion and evaluation system. Application-oriented colleges and universities lack of exploration into the model of integrated teaching of science and education, and it is difficult to implement the model.

### **3.3. The operation mechanism of science and education integration is not perfect**

At present, the operation mechanism of science and education integration in colleges and universities is not perfect, and the corresponding incentive mechanism and evaluation and supervision mechanism are lacking, which is not conducive to the sustainable development of science and education integration. The integration of science and education in colleges and universities includes the formulation of talent training program, curriculum construction, practice platform construction, the organization and implementation of practice and training inside and outside the school, scientific research innovation and achievement transformation. As the main body of talent training, students are the key to evaluate educational achievements. In some applied colleges and universities, the classroom teaching effect is not ideal, students feel that the classroom knowledge is boring, resulting in the derailed between the classroom teaching knowledge and practical application, which is not conducive to the cultivation of students' creativity and career development, and students have a poor sense of professional belonging, which leads to the decline of learning initiative.

## **4. Suggestions on Implementing The Talent Training Mode of Integrating Science and Education in Applied Colleges and Universities**

How to build a circular system of "education - science and technology - talents", nourish education with science and technology, train talents with education, promote science and technology with talents, co-educate talents with science and technology, evaluate education with talents, spread science and technology with education, and organically combine education, science and technology and talents to form a new model of integrated training of science and education, it is still necessary to accumulate experience and strengthen reform. Specific suggestions are as follows.

#### **4.1. Implement the incentive mechanism of science and education integration and create an academic education environment**

We will implement the incentive mechanism for the integration of science and education and break down the barrier of separation between science and education. In the assessment of teachers' scientific research achievements, attention should be paid to whether the scientific research achievements serve the major needs of the country, focusing on the level of scientific research rather than the number of achievements. Give full play to the supporting and leading role of scientific research in talent cultivation, implement the teaching incentive plan for undergraduate teachers, encourage professors to take the podium, so that colleges and universities can return to the track of collaborative education of science and education, and cultivate high-level innovative talents. We should actively create an academic education environment, strive to build a teaching environment of academic temple, and build smart classrooms and seminar rooms conducive to inquiry-based teaching. Students are allowed to contact scientific problems and carry out scientific research in participating in teachers' scientific research projects, cultivate students' professional knowledge and practical skills in scientific research practice, cultivate students' ability of information retrieval, scientific experiment and engineering practice, and effectively improve students' thinking ability and innovation ability. Extensive academic lectures and reports are offered to stimulate students' enthusiasm for scientific research. Graduate students are encouraged to participate in academic exchange activities, have extensive contact with peer experts, and broaden their academic horizons. Problem-oriented, project-oriented, attracting graduate students to participate in project research, cultivating the original innovation ability of graduate students, and providing decision support for the deep integration of science and education.

#### **4.2. Scientific research feeds teaching and explores a new model of integrated teaching of science and education**

Scientific research feeds teaching, and insists on keeping pace with The Times. Through "integrating the latest scientific research results into curriculum teaching" and "incorporating the latest scientific research results into textbooks", the teaching of scientific research empowerment is highlighted to promote the improvement of students' problem-solving ability. Stimulate the creativity of teachers, introduce the latest scientific research results into teaching, avoid the rigidity of the curriculum content, adhere to the openness and experience of inquiry in the teaching process, create teaching situations, propose new research questions, stimulate students' curiosity, allow students to explore independently, encourage students to participate in and question innovation, and enhance students' research interest. Through the setting of undergraduate science and technology innovation projects to cultivate and improve the scientific research ability of undergraduates, encourage undergraduates to enter the scientific research laboratory to participate in subject research. In the process of graduate training, we pay attention to the "personalized training" of graduate students, encourage graduate students to take interdisciplinary and cross-school elective courses, combine major scientific facilities and research projects to train graduate students, encourage students to use advanced scientific research platforms and experimental devices, and jointly carry out scientific research with tutors. Make scientific research equipment and equipment in colleges and universities open to students, promote the accumulation of scientific and educational innovation resources in education, teaching and talent cultivation, and establish a long-term mechanism for scientific research to feed teaching and talent cultivation.

### **4.3. Give full play to the characteristics of universities and highlight the discipline traction**

Give full play to the characteristics and advantages of application-oriented colleges and universities, innovate organizational models, highlight discipline traction, build science and education cooperation platforms in colleges and universities with specific discipline directions under first-level disciplines as the basic unit, provide service support for professional education, scientific and technological innovation and talent aggregation, and create a good atmosphere conducive to teacher-student interaction and scientific spirit cultivation. With the first-class talent team as the core, the integration of disciplines, platforms and teams as an overall plan and system construction, constantly improve the means of "science", build the foundation of "teaching", effectively integrate "education - science and technology - talent", and strive to achieve an all-round, multi-dimensional and deep-level integration and collaboration of "science" and "teaching". Adhere to the "scientific research training personnel, project training personnel", support teachers to integrate the practical experience of front-line scientific research into the curriculum in teaching, focus on interdisciplinary scientific research projects, focus on the key problems in the project, from problem analysis to problem solving, enhance the subjectivity of teachers and students, guide students to find problems, analyze problems, solve problems, and clarify the direction of improvement. Cultivate students' continuous learning ability and scientific literacy.

### **4.4. Establish a stepped talent training model**

Establish the "undergraduate-graduate" stepped science and education integration talent training model. According to the different training goals of undergraduates and postgraduates, the stepped science and education integration innovation training plan is formulated from the undergraduate stage. Through the mode of mentoring undergraduates by postgraduates, a joint training group of postgraduates and undergraduates is formed. Achieve a virtuous cycle of complementary advantages, resource sharing and mutual promotion. Under the leadership of graduate students, undergraduates can quickly integrate into scientific research projects and participate in research practices such as demand analysis, project research and development, and experimental operation. In this process, they can cultivate their higher-order thinking and improve the team coordination ability of graduate students. At the same time, undergraduates enter the research platforms such as engineering centers and laboratories, participate in the scientific research projects of teachers, and cultivate their independent thinking ability, which can better connect with the graduate stage and improve their scientific research ability and practical ability. Guided by students' learning outcomes, open student fund projects are set up to increase students' innovative practice opportunities, promote the integration of professional knowledge, scientific research and social practice, and comprehensively cultivate students' scientific research and innovation ability.

In the process of talent cultivation of the stepped integration of science and education, undergraduates should realize that scientific research is not only about learning theoretical knowledge, but also should have a certain spirit of independent learning and exploration, so as to stimulate the initiative and enthusiasm of undergraduates and increase the motivation of academic research. While leading undergraduates in the open fund project and innovation competition project, graduate students can exercise their team management ability, communication ability and expression ability, and also make them realize the deficiency of their professional knowledge and team management ability, so as to encourage them to constantly improve their own ability. Thus forming a spiral space of mutual promotion, continuous learning and progress. Through the stepped integrated training of science and education for undergraduates and postgraduates, the practical teaching links such as experimental teaching and graduation design for undergraduates and postgraduates are reconstructed and optimized,

and the independent choice and individual differences of students are respected by enterprises' practical activities and research projects as the carrier, so as to integrate the concept of science and education into the whole process of talent training.

#### **4.5. Innovate teaching methods and implement information-based teaching reform**

Innovation in teaching methods, the integration of science and education teaching reform focuses on the integration of theoretical research and practical exploration, promotes the results of scientific research projects and enterprise experts to enter the classroom, and explores the teaching model that combines scientific research and education with the integration of science and education. In the preparation stage of teaching, based on the teaching syllabus, the author analyzes the needs, tasks and learners' basis of the course objectives and course contents, designs the integration of "scientific research and teaching" and the mode of knowledge transfer, and designs the interactive discussion links and programs in teaching activities to enhance students' sense of integration and participation in the course. In addition, the evaluation process and method of classroom learning effect are designed to get the feedback of students in time.

Implement the reform of information-based teaching, build online courses and online learning platforms, carry out networked course teaching, and teachers regularly recommend the latest information and high-quality resources in the field online, so as to realize online continuous learning and interactive learning. In the teaching process, the use of rich hot video resources to carry out teaching, not only to examine students' understanding of knowledge, but also to examine students' ability to use knowledge. Establish the hot topic library of the course, support the multiple assessment mechanism of the course teaching, and organically combine the process evaluation with the final assessment.

### **5. Conclusion**

Application-oriented colleges and universities are an important part of the national scientific and technological strength and an important force for the construction of an innovative country. They have multiple functions such as talent cultivation, scientific research, social service and cultural inheritance, and are an important pillar for realizing national scientific and technological self-reliance. Building a model of integrating science and education is the only way to cultivate high-quality applied talents. It is necessary to deepen the integration of science and education and cooperation between schools and enterprises, promote the effective connection of education chain, talent chain, industrial chain and innovation chain, and promote the conformal development of higher education. Application-oriented colleges and universities must clearly define their school positioning, constantly innovate their educational concepts, develop and improve the training mode of talents integrating science and education with the training of talents' application ability as the core, provide intellectual and talent support to serve regional social and economic development, promote industrial quality and efficiency, and contribute to the construction of an innovative country.

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