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Research on The Problems and Countermeasures of The Integration of Science and Education in Local Universities

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Abstract

The integration of science and education is a key focus in the development of contemporary college teaching. However, significant shortcomings exist in the implementation of this integration in Chinese local colleges and universities. This paper identifies four primary challenges associated with the integration of science and education in these institutions: insufficient integration efforts, ineffective training outcomes, an inadequate evaluation system, and a lack of systemic support. Furthermore, it proposes corresponding countermeasures to address these issues. The findings of this study offer valuable insights for promoting the integration of science and education in local colleges and universities.

Keywords

Local universities; Integration of science and education; Countermeasures and suggestions.

1. Introduction

In August 2018, the Ministry of Education, the Ministry of Finance, and the National Development and Reform Commission jointly issued the "Guiding Opinions on Accelerating the Construction of 'Double First-Class' in Institutions of Higher Learning," which explicitly calls for "strengthening scientific research and education, integrating national key and major science and technology plans and tasks, establishing a collaborative training mechanism that promotes the integration and mutual reinforcement of science and education, and fostering the organic combination of knowledge acquisition with scientific research and skill development." This document emphasizes the significance of integrating science and education within colleges and universities. For local colleges and universities, talent cultivation is both the core and foundational function, distinguishing them from other local organizations. Scientific research serves as a crucial avenue for enhancing the teaching and social functions of these institutions, and the synergy between educational practices and research endeavors is essential for the cultivation of innovative talents. Consequently, the strategy of integrating science and education, which primarily aims to facilitate personnel training, has emerged as a challenge that all local colleges and universities are collectively striving to address.

The integration of science and education was put forward by the German Humboldt in the early 19th century and implemented in the University of Berlin. The principles of "small scale", "professors running the university" and "universities conducting scientific research" became one of the important practical conditions for the integration of science and education at that time. Later, according to the spirit of integration of science and education and the previous experience of German universities, Johns Hopkins University in the United States combined graduate education with scientific research in university education, encouraged teachers and

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students to engage in original exploration, and founded academic journals to connect with the academic world for exchange, thus establishing the teaching principle[1] of integration of science and education in American universities. The strategy of integrating science and education in Chinese universities has been gradually established[2][3] after several stages of reform and adjustment. In 1956, China's Draft Science and Technology Vision Plan 1956-1967 stated that, under certain circumstances, institutions of higher learning had the right to set up independent research LABS, and industrial departments and research institutes were encouraged to incorporate smaller research institutes into the university system. In 1961, China issued the "60 Articles of Higher Education" on a trial basis, which clearly stated that institutions of higher learning should actively participate in scientific research activities. Since the 1980s, China has implemented a series of reforms aimed at integrating science education and research. For example, strengthening the scientific research function of universities while supporting graduate education in the academy of Sciences system. These historical documents and reform measures show the efforts and challenges of integrating science and education in China, but they have failed to fundamentally change the long-standing separation between science education and scientific research, and there are still problems [4][5]such as inadequate integration of scientific research and personnel training. As far as local colleges and universities are concerned, personnel training, scientific research and social service are their three major functions, among which the failure of effective integration of scientific research and personnel training is a common problem [6]Some scholars put forward the countermeasures [7][8]Although scholars have explored the status quo and causes of the separation of science and education, and put forward relevant countermeasures, the research on the integration of science and education in colleges and universities is not deep enough, especially the research on the integration of science and education in local colleges and universities is obviously insufficient. Based on this, this paper focuses on analyzing the problems existing in the integration of science and education in local colleges and universities, and puts forward corresponding countermeasures.

2. Problems Existing in The Integration of Science and Education in Local Universities

2.1. Insufficient impetus for integration

In the college education system, teaching and research are fundamentally in a state of symbiosis and mutual prosperity. When individual educators operate in an ideal environment, the positive characteristics of teaching and research align and reinforce one another, leading to a favorable trend of organic unity and collaborative development between the two. In practice, teachers frequently witness the escalation of the conflict between teaching and research, as well as the increasing dissatisfaction of teachers due to their multiple responsibilities, especially in research universities[9]. Currently, the evaluation system in local colleges and universities tends to be rigid, with scientific research indicators comprising a significant portion of the evaluation index for faculty members. Consequently, teachers at these institutions are required not only to fulfill a substantial number of teaching responsibilities but also to pursue scientific research outcomes amid relatively constrained research resources and conditions. Given that the promotion and evaluation systems in colleges and universities typically place a strong emphasis on research achievements—such as publications and project applications—faculty members are increasingly inclined to allocate their time and energy to research activities, often at the expense of updating curriculum content and innovating teaching methods. In addition, due to the weak overall scientific research conditions in local universities and the lack of sufficient funding and facility support, many teachers find it difficult to convert their scientific research results into high-quality teaching content, which leads to the separation

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between scientific research and teaching[10]. For students, participation in scientific research projects and practical research experiences can enhance their critical thinking, cognitive skills, and innovative abilities. However, students in local colleges and universities often face heavy coursework demands, and because scientific research activities are not directly convertible into academic credits, they tend to prioritize course learning over engaging in research projects when fulfilling degree requirements. As scientific research activities are frequently perceived as an additional burden, students' interest and enthusiasm for research are diminished. This issue is particularly pronounced in environments characterized by limited resources and insufficient support, which further restrict students' opportunities to engage in scientific research and acquire practical experience, leading to a disconnection between research and teaching. Additionally, the subject offerings and curriculum structures in local universities are often inflexible, hindering the effective organic integration of scientific research with classroom instruction. Consequently, students lack the necessary guidance and support to stimulate their interest and involvement in research activities. As a result, both faculty and students may lack motivation to participate in research endeavors, causing the integration of science and education to remain largely superficial rather than substantial.

2.2. The training effect is not significant

The issue of ineffective integration of science and education is particularly prominent in local colleges and universities. Scientific research is fundamentally a process of identifying problems, exploring knowledge, and developing solutions. Thus, the teaching of any subject should be closely intertwined with scientific research. However, in local colleges and universities—especially in the disciplines of humanities and social sciences—there exists a tendency to emphasize practical application and prioritize theory in instruction. To address the deficiencies in teaching, many local colleges consciously adopt pedagogical methods aligned with societal needs and emphasize courses that have practical applications. Nevertheless, these courses often lack continuous updates that incorporate the latest scientific research findings, and sufficient funding and support for scientific education are necessary to achieve these updates. Since many local universities perform poorly in rankings related to theoretical research and often lack the financial resources required to promote courses integrating science and education, they tend to favor practical courses closely connected to real-world applications. While this teaching strategy may facilitate students' quick adaptation to the demands of the job market and help meet institutional employment rate metrics, it has limited effectiveness in fostering further academic training and the development of innovative abilities.

Moreover, this approach, which favors practice over theory, does not effectively advance the deep integration of science and education; thus, its marginal contribution to cultivating innovative talent remains minimal. The imbalance in resource allocation within local universities further exacerbates the challenges associated with integrating science and education, as disciplines that rely heavily on ongoing academic research require closer integration with educational content. As a consequence of these factors, the effectiveness of the integration of science and education in the humanities and social sciences education within local universities is not apparent, highlighting the urgent need to focus on methods for effectively incorporating scientific research findings into teaching.

2.3. The evaluation system is imperfect

In the current higher education system, universities place significant emphasis on professional publications, research projects, and research-related performance indicators in the context of subject rankings, accreditation evaluations, and professional certifications, all of which are heavily influenced by international ranking standards. Consequently, local universities tend to overemphasize the construction of academic disciplines, faculty achievements, and research outputs during the selection process for "Double First-Class" status, often at the expense of

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effectively integrating teaching and research. This evaluation mechanism, which favors scientific research, presents multiple challenges for the integration of science and education within local universities. Teaching effectiveness is difficult to quantify through specific indicators, leading universities to prioritize the allocation of resources to research activities that can directly enhance their rankings. Although the soft ranking method established in 2024 emphasizes the quality of new students as a primary evaluation index within the talent training dimension, the assessment of the integration of science and education remains inadequately and subjectively captured. This limitation results in the efforts of local universities to promote the integration of teaching and research being insufficiently recognized and supported. Furthermore, local universities face challenges in attracting high-quality freshmen and securing funding for research, compounded by comparatively uncompetitive research conditions on the international stage. These factors place local universities at a disadvantage in academic competition, both nationally and globally. The evaluation system, which is predominantly driven by research outcomes, hinders local colleges and universities in effectively integrating science and education, particularly with regard to maintaining teaching quality and updating course content. As a result, it becomes challenging for faculty and students in local universities to strike a balance between teaching and research, adversely impacting the overall development of students and their innovative capabilities. This tendency to prioritize scientific research over teaching may ultimately undermine the core competitiveness of local universities in education and training.

2.4. Imperfect system guarantee

The integration of science and education encompasses not only the internal systemic construction of universities but also collaboration with external scientific research institutions and technology companies. However, local colleges and universities exhibit clear deficiencies in establishing systems for integrating science and education with these external entities. Despite attempts to strengthen integration through partnerships with scientific research institutions and technology companies—aimed at better aligning with societal needs, achieving employment targets, or acquiring cutting-edge industry knowledge—numerous incongruities often arise during the cooperative process. Firstly, scientific research institutions and technology companies typically prioritize the economic outcomes of collaboration, including the practical application of theories and the commercial value of scientific and technological advancements. They often show little interest in the pure exploration of academic theories, which leads to a misalignment between their cooperation goals and the educational objectives of universities. While universities aim to promote academic output and meet the diverse teaching needs of students, they frequently find it challenging to directly utilize the research results from partner institutions, resulting in outputs that may not meet the expectations of their collaborators.Secondly, local universities often lack effective coordination mechanisms to reconcile teaching requirements with the objectives of research partnership when collaborating with external institutions. This lack of coordination is particularly evident in foundational disciplines that require strong theoretical support and in-depth exploration; unfortunately, these fields frequently fail to attract the attention and investment of technology companies and leading research institutions. Moreover, local universities face additional challenges in external cooperation, including improper resource allocation and ineffective information exchange. Scientific research institutions and technology companies may not provide adequate support due to a lack of understanding of the internal conditions and needs of universities. Conversely, universities may struggle to effectively attract and leverage external resources for the integration of science and education. Consequently, cooperation between universities and external entities often falls short of achieving the desired effects of integration, resulting in inadequate progress in both teaching and research.

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Therefore, while the cooperative relationship between local universities and external scientific research institutions and technology companies theoretically serves as a vital mechanism for promoting the integration of science and education, it frequently encounters practical difficulties due to structural and procedural inadequacies. This imperfect system amplifies the complexity and challenges faced by colleges and universities in their pursuit of integration, necessitating fundamental solutions through the establishment of more effective coordination mechanisms.

3. Measures to Promote The Integration of Science and Education in Local Universities

3.1. Detailed assessment indicators

To solve the problem of separation of science and education, the assessment indicators of teachers and students should be detailed. For teachers, it is necessary to specify how many scientific research projects should be incorporated into the teaching in each period, and to formulate quantitative and qualitative standards for the introduction of the latest scientific research results and experimental projects in each course. In addition, clear regulations should be made, requiring students cultivated through the integration of science and education to have certain academic and practical abilities, encouraging students to participate through credits and honors, and standardizing this index as far as possible to make it intuitive. In addition, teachers are evaluated and motivated by the two aspects of curriculum development index and teaching results. With the help of modern means, such as online anonymous questionnaire, video uploaded to the Internet for public evaluation of the whole school, students and teachers from both sides of the teaching and scientific research to assess teachers anonymously. In terms of students, the system of students' participation in scientific research should be optimized, such as incorporating students' scientific research activities into the credit system and allowing the results of scientific research projects to be part of the course grades, so as to reduce the pressure of students' choice between scientific research and course study. And clearly stipulate the basic evaluation standards of scientific research projects to promote students to invest their energy. And introduce socially recognized institutions or influential companies to participate in the evaluation of students' scientific research ability to ensure that the results of science and education integration are in line with social needs and current trends.

3.2. Customize the training method

To achieve a more effective integration of science and education, local colleges and universities should implement customized training methods that not only enhance students' academic abilities but also prevent the socialization and mediocrity of educational content, avoiding the reduction of education to mere vocational training for employment. In practice, it is essential to establish closer collaborative relationships among subject teaching teams, fostering comprehensive development across various disciplines through the formation of complementary subject interactions and exchanges. This approach will facilitate broader and more practical applications of scientific research activities. Furthermore, universities should organize more innovation and research-related activities aligned with subject content, such as academic competitions and research projects. These activities should be formally included in the assessment criteria for both students and faculty to stimulate their motivation for participation in scientific research and teaching innovation. Additionally, it is crucial to update course materials and teaching methods to incorporate the latest research findings, ensuring that the content reflects current academic trends in real time.When promoting the integration of science and education in the humanities and social sciences, local universities must also pay special attention to the allocation and optimization of teaching resources. This includes, but is

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not limited to, providing adequate funding for scientific research, upgrading experimental and research facilities, and enhancing the professional training of faculty members. By implementing these comprehensive measures, local colleges and universities can advance the integration of science and education while simultaneously improving the quality of education and the overall capabilities of their students.

3.3. Optimize the evaluation system

establish an evaluation system for the integration of science and education that is aligned with China's national conditions and adheres to the principles of socialism with Chinese characteristics, local colleges and universities must undertake comprehensive system design and practical implementation in accordance with the spirit of the National Education Conference. This evaluation system should prioritize applied basic research and breakthroughs in key technologies, while emphasizing innovation in modern engineering technology and disruptive technologies. Crucially, there is a need to fundamentally shift away from an over-reliance on traditional evaluation indicators, such as publication counts, degree levels, professional titles, and various awards. Instead, the focus should be on the tangible outcomes of the integration of science and education, particularly in the area of personnel training. In practice, local colleges and universities should prioritize the development of practical and innovative abilities, using the results of this cultivation as significant metrics for evaluating both faculty and students. Moreover, the practical application value of integration activities should be enhanced, including addressing real-world problems through academic research, translating research findings into specific technologies or products, and ensuring the application and protection of intellectual property rights throughout the process. The evaluation system should also encompass a direct assessment of the contributions made through integration activities, such as evaluating the efficiency of transforming scientific research outcomes into patent applications, technology transfers, or successful industrial applications. Concurrently, local universities should encourage and reward faculty and research teams that effectively incorporate scientific research into teaching and student training. It is essential to safeguard the creativity of talents and enhance the application and protection of intellectual property rights, positioning these as crucial factors in promoting the integration of science and education.

3.4. Improving institutional guarantees

In organizations where knowledge is the core competitive advantage, such as scientific research institutions and universities, human resources serve as fundamental assets, with individual innovation capabilities and creativity acting as the primary driving forces behind the continuous progress and development of the organization. Consequently, the key to ensuring the efficient operation of these institutions lies in building effective teams and fully stimulating individual initiative. To enhance the integration of scientific research and education, universities should actively leverage their internal and external research bases to establish independent research institutes, effectively internalizing the transformation and coordination between research and teaching. It is essential to improve the "dual employment" system involving off-campus research institutions and on-campus research facilities. This approach should not only facilitate the introduction of external research experts to deliver lectures on campus—creating a "catfish effect" that invigorates on-campus research—but also involve sending faculty and talented individuals to work in off-campus settings to gain practical experience in their respective disciplines and apply scientific research effectively. Upon their return, these individuals can enhance internal teaching and foster the integration of scientific research, teaching, and social practice. Local governments should also provide greater support for scientific research initiatives at local colleges and universities, assisting them in the execution of research projects. Utilizing government resources and networks, it is important to promote the establishment and improvement of collaborative platforms, such as local

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government partnerships, university-institution collaborations, and science-teaching platforms. Under the guidance of local governmental authorities, efforts should be made to facilitate the combination of private and public funding, establishing foundations to subsidize research projects that address local needs. This strategy can contribute to the formation of a research funding system aimed at promoting the integration of science and education.

4. Conclusion

The integration of science and education in local universities in China still faces a long road to explore, and more scholars need to pay attention to this field. But we can also be certain that in recent years, the concept of integrating science and education has become increasingly deeply rooted in people's hearts, and local universities are constantly exploring ways to educate people through the integration of science and education based on their own practices. Under the guidance of the methodology of practice, understanding, re practice, and re understanding, local universities will definitely be able to promote the deep integration of science and education, and provide strong talent support for economic and social development.

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References

[1] Zhang Lei. The Structuralization of Science and Education Integration and the Origin of Research University -- The Institutional Innovation of Johns Hopkins University [J]. Higher Education Research, 2016, 37(5): 79-86.

[2] Zou Xiaodong, Han Xu, Yao Wei.Integration of science and Education: The New normal of university running [J]. Higher Engineering Education Research, 2016(1): 43-50.

[3] Zhou Guangli, Jiang Jiale, Wang Sunyu, et al. The educational nature of university research: The dilemma of integration of science and Education and the adjustment of public policy [J]. Higher Engineering Education Research,2018(01):88-94.

[4] Zou Xiaodong, Han Xu, Yao Wei. Integration of science and Education: The New normal of university running [J]. Higher Engineering Education Research, 2016(1): 43-50.

[5] Zhou Guangli, Jiang Jiale, Wang Sunyu, et al. The educational nature of university research: The dilemma of integration of science and Education and the adjustment of public policy [J]. Higher Engineering Education Research,2018(01):88-94.

[6] Li Xiaonian, Fang Xueli. Research on Synergistic Development of major Construction and Discipline Construction in local high-level universities [J]. Journal of National Institute of Education Administration, 2015(06): 13-16.

[7] Luo Zhuhua. The Dilemma, underlying causes and Countermeasures of the integration of Science and Education [J]. Science and Technology of Chinese Universities, 2020(7):71-73.

[8] Chen Tingzhu, Duan Binbin. How to view the integrated development of Science and Education between local Academy of Sciences and provincial universities [J]. University Education Sciences,2022(02):19-27.

[9] Li Qingquan. Doing a good job in undergraduate education is the key to improving the quality of talent training [J]. China Higher Education, 2011(20): 36-39.

[10] Zhu Ling. Analysis on Teacher Performance Appraisal in Teaching Colleges and Universities [J]. Cultural and Educational Materials, 2008(33):158-160.