Talent Training Mechanism of Carbon Peak and Carbon Neutralization in New Liberal Arts: a Chinese Perspective

Abstract:

China is currently the world's largest carbon emitter. New liberal arts, as an important discipline for cultivating humanistic literacy and social responsibility, is closely related to the achievement of carbon neutrality goals. By using the method of logical reasoning and deduction, seven talent training mechanisms were proposed including the optimization mechanism of the talent training goal, the interdisciplinary course integration mechanism, the education mechanism of the scientific research innovation platform, the social practice mechanism, the cultivating mechanism with a sense of social responsibility, the mechanism of international cooperation and school-enterprise cooperation and exchange mechanism, and the evaluation mechanism of talent training. These mechanisms may improve the comprehensive quality and ability level of students and provide talent guarantees for the achievement of China's "carbon peak and carbon neutralization" goal.

Keywords: New liberal arts; Carbon peak; Carbon neutrality; Talent training

Types of articles: Original Research Article

I. Introduction

As global climate change becomes increasingly severe, "carbon peak and carbon neutralization" has become an important issue of common concern in the international community(Grainger & Smith, 2021; Liu et al., 2022; Wei et al., 2022). China is currently the world's largest carbon emitter since 2006(Wei, 2024; Zhang & Xu, 2023). China is striving to achieve carbon peak by 2030 and carbon neutrality by 2060. Against this background, the establishment of the new liberal arts talent training mechanism of "carbon peak and carbon neutralization", which will be an important direction of higher education reform and shoulder the responsibility of cultivating talent for the new era with a sense of social responsibility and an innovative spirit, is particularly important mission for China. The new liberal arts education not only requires students to master solid professional knowledge but also emphasizes interdisciplinary integration, critical thinking, innovation ability, and the ability to solve

complex problems(Godwin & Altbach, 2016; Nishimura, 2023; Richardson, 2023; Schaefer, 2021). The new liberal arts "carbon peak and carbon neutralization" talent training mechanism refers to a set of training systems and mechanisms that train talent with relevant knowledge, skills and innovation abilities to address climate change and promote carbon emission reduction, including talent training objectives, research on the curriculum system, scientific research innovation, social practice, social responsibility, international exchange and school-enterprise cooperation, and evaluation systems. The construction of a new liberal arts "carbon peak and carbon neutralization" talent training mechanism is not only an important measure for responding to national strategic needs but also an important path for promoting the quality improvement and connotative development of China's higher education.

At present, the research on "carbon peak and carbon neutralization" is mainly focused on policy formulation, technological innovation, and economic analysis, while there are relatively few studies on talent training mechanisms. Especially in the context of new liberal arts, how to integrate the concept of "carbon peak and carbon neutralization" into the entire process of talent training to cultivate compound talent with both professional knowledge and interdisciplinary accomplishment has become an urgent problem to be solved. Therefore, the purpose of this study is to deeply analyze the intrinsic relationship between new liberal arts education and "carbon peak and carbon neutralization" and to construct a talent training mechanism that meets current requirements and provides strong support for the reform and sustainable development of higher education in China.

2. Literature review

At present, there are some researches being done in the education field of "carbon peak and carbon neutralization" at the global level. For example, Yang et al. (2022) talked about the teaching reform of resources majors in colleges and universities under the background of "carbon peak and carbon neutralization", taking mineral resources exploration course as an example. Han (2022) researched the Carbon Peak and Carbon Neutralization Model in Colleges and Universities, taking China University of Geosciences (Beijing) as an Example. The paper conducts benchmarking research on the path towards "carbon peak and carbon neutralization" in universities, which is conducted using the ecological factor method, campus carbon footprint, and

questionnaire analysis. Li (2023) examined the reform of teaching business intelligence courses in the context of “carbon peak and carbon neutralization”, and point out that we should focus on enhancing students' professional application ability and environmental awareness to better meet social needs, timely follow up on the reform of professional courses, incorporate participation in the “carbon peak and carbon neutralization” action into the business intelligence course training framework. Wei et al. (2024) focused on the national "carbon peak carbon neutral" strategy in the field of new materials, put forward the "four synergistic" reform ideas for the cultivation of high-level new materials innovation talents, which adopts the disciplinary synergistic, scientific and educational synergistic, industrial synergistic and international synergistic approaches. Jingnan (2023) discussed the development direction and practice path of the environmental engineering professional curriculum system in the context of carbon neutrality. Duan and Yu (2023) analyzed the problems in the training of talents in the field of green and low-carbon transportation, and put forward targeted strategies with a view to better serving the goals of carbon peaking and carbon neutrality. Sun (2024) pointed out that by perfecting the green education system, building a "big ideology and politics" pattern of green education, promoting the integration of resources, advancing the unity of students' knowledge and behavior, developing a diversified evaluation system, and constructing a new pattern of green education, the effectiveness of green education will be continuously improved, so as to better contribute to the realization of the goal of "dual-carbon". Zhang (2023) discussed three talent training mechanisms, namely, the "dual-carbon" industry-university-research integration mechanism, the carbon management responsible mechanism, and the supporting mechanism for continuing education for "dual-carbon" professionals. J. lI et al. (2023) believes that colleges and universities should broaden practical education pathways, build zero-carbon campuses, and create carbon-neutral educational environments through building a carbon-neutral general education knowledge system, integrating carbon-neutral education into professional teaching, and so on, so as to help realize carbon-neutral goals. L. Li et al. (2023) recommended the establishment of an effective mechanism to forecast and monitor information and data on the supply and demand of "green talents", the strengthening of education and training for "green talents" teachers, the increase of financial investment in "green skills" training, the establishment of an inter-ministerial coordinating mechanism, the strengthening of cooperation between universities and industry, the enhancement of the

participation of enterprises in the training of "green talents", the incorporation of "green skills" into occupational standards and the standardization of the process of assessment and accreditation, the broadening of high-tech talent training, the enhancement of publicity on green careers for young people and the non-formal population, and the strengthening of inter-provincial and international cooperation and exchanges of talents.

However, there is a real dearth of research on carbon peak and carbon neutralization in the new liberal arts. We only find that Jin et al. (2023) studied the objective of “carbon peak and carbon neutralization” talent development in the New Liberal Arts. Against this background, it is necessary to conduct a study on the development of carbon peak and carbon neutralization talents in the New Liberal Arts. The purpose of this study is to deeply analyze the intrinsic relationship between new liberal arts education and “carbon peak and carbon neutralization” and to construct a talent training mechanism that meets current requirements and provides strong support for the reform and sustainable development of higher education in China.

3. Knowledge gap and Method

3.1 Knowledge gap

New Liberal Arts. Hiram College in the U.S. has flagged the idea of a new liberal arts education. Beginning in October 2017, the college overhauled its training program and reorganized its 29 majors, i.e., integrating new technologies into courses in philosophy, literature, language, and other such subjects to provide students with comprehensive, interdisciplinary learning(Cheng, 2022; Hu, 2022). The new liberal arts, based on the existing traditional liberal arts, reorganize the courses of various majors in the disciplines to form a cross section of arts and sciences, i.e., integrating modern information technology into the courses of philosophy, literature, language, and other such courses, to provide students with comprehensive interdisciplinary learning, and to achieve the expansion of knowledge and the cultivation of innovative thinking(Miller, 2017; Zhou, 2023).

Carbon peak and carbon neutralization. "Carbon peak" refers to the highest point of carbon emissions, i.e., the point at which carbon emissions change from rising to falling at global, national, city, and enterprise levels(Liu et al., 2022; Niu et al., 2022). "Carbon Neutralization" refers to achieving net zero emissions by reducing greenhouse gas emissions

and adopting emission-negative measures, resulting in carbon dioxide emissions being equal to or less than the amount of carbon dioxide absorbed(Chen et al., 2023; Waher et al., 2022; Wu et al., 2022).

Carbon peak and carbon neutralization talent in the new liberal arts. Carbon Peak and Carbon Neutralization Talent in the New Liberal Arts refers to talent with interdisciplinary knowledge and skills that are needed to address climate change and promote carbon peak and carbon neutralization. While talent in traditional science, technology, engineering and math (STEM) fields plays an important role in the low-carbon transition, there is also a need for more liberal arts talent to address complex social, economic and political challenges.

3.2 Research design

Through literature research, we will summarize the relevant educational research experience of carbon peak and carbon neutralization firstly. Then we will then combine this with the current state of development of carbon peak and carbon neutralization in China, as well as the characteristics of its demand for talents in the new liberal arts. Finally, we will propose a mechanism for cultivating talents in carbon peak and carbon neutralization in the new liberal arts from China's perspective, using logical reasoning and deduction. The study design is shown in Figure 1.

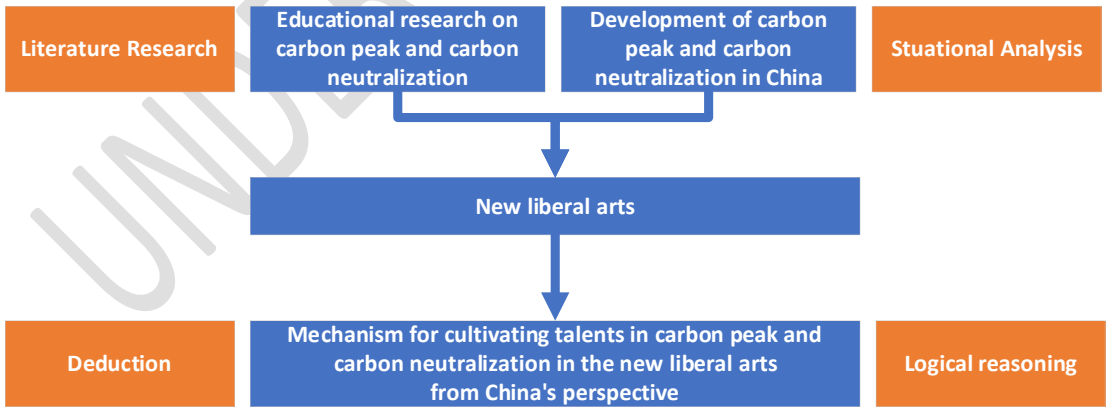

Figure 1. Study design

4. Results

As the issue of global climate change becomes increasingly serious, carbon peaking and carbon neutrality have become the focus of common attention around the world. To cultivate new

liberal arts talent with the knowledge and ability of “carbon peak and carbon neutralization”, the following talent training mechanism has been constructed:

4.1 Optimization mechanism of the talent training goal of “carbon peak and carbon neutralization”

In view of the particularity of the “carbon peak and carbon neutralization” field, the training objectives of the new liberal arts should focus on the cultivation of high-quality talent with interdisciplinary knowledge and innovation ability. This requires relevant majors to establish a mechanism to continuously optimize the training objectives, which should always be that the training programs are in line with the times. The new liberal arts “carbon peak and carbon neutralization” talent should be able to deeply understand the core concept, technology path and policy system of “carbon peak and carbon neutralization” and have the ability to solve practical problems in this field. The core task of the new liberal arts "Peak Carbon Neutrality" talent training mechanism is to impart basic knowledge of "Peak Carbon Neutrality". Through the update of the training objectives, knowledge of the basic concepts, principles and international background of carbon emission reduction and carbon neutrality, the sources and impacts of carbon emissions, emission reduction technologies, and carbon trading mechanisms will be integrated into the teaching system. To enable students to learn about the concept and practice of the sustainable development of the economy, society and environment, to comprehensively understand the significance of the goal of “carbon peak and carbon neutralization” and the profound understanding of the importance of “carbon peak and carbon neutralization”, and to cultivate students’ awareness of sustainable development. It lays the foundation for subsequent practice.

4.2 “carbon peak and carbon neutralization” interdisciplinary course integration mechanism

The curriculum system in the talent training of "Dafeng Carbon Neutrality" should be constructed around the core knowledge of "Dafeng Carbon Neutrality", including environmental science, energy technology, policy analysis, sustainable development, etc. At the same time, attention should be given to the integration of interdisciplinary courses, such as data science, economics, and sociology, to cultivate students’ comprehensive thinking ability. By integrating the knowledge of environmental science, economics, sociology, law and other

disciplines, we will analyze domestic and international energy and environmental policies, assess the impact of the policies on "carbon peak and carbon neutralization", and explore the connotations, paths and methods of sustainable development. Social responsibility refers to training students with the concept of sustainable development and an interdisciplinary way of thinking. We integrate economics and finance to study the market mechanism of environmental resources, green financial products and instruments and explore how to promote carbon peaking and carbon neutrality through green finance. Through the integration of applied mathematics, statistics, and data science, the data analysis model and platform of "carbon peak and carbon neutralization" will be constructed, and the ability of students to use big data technology for data analysis and decision support will be cultivated.

4.3 Education mechanism of the scientific research innovation platform "carbon peak and carbon neutralization"

In the cultivation of new liberal arts talent with the goal of "carbon peak and carbon neutralization", the cultivation of innovation ability is indispensable. The construction of platforms such as innovation experiments and research projects can motivate students to participate in scientific research and innovation activities, enable students to accept the training of innovation and entrepreneurship ability, expand their knowledge and skills in innovative thinking, entrepreneurship, and business model innovation, and train students to actively explore the professional quality of courage to practice. Specifically, relevant scientific research projects can be set up, providing scientific research platforms and funding support, to guide students to carry out research in the field of "carbon peak and carbon neutralization" and to cultivate their scientific research innovation ability and ability to solve practical problems. Regularly organizing interdisciplinary seminars and inviting experts and scholars in related fields for exchanges and discussions can also broaden students' academic horizons and enable students to analyze and solve the problem of "carbon peak and carbon neutralization" from multiple angles. Through the training of innovation and entrepreneurship ability, students can propose innovative "carbon peak and carbon neutralization" solutions to promote the development and innovation of related industries.

4.4 Social practice mechanism for "carbon peak and carbon neutralization" talent training.

"Carbon neutralization" talent not only needs a solid theoretical foundation but also has solid social practice ability. Practice teaching is an important link in improving students' practical operation ability and problem-solving ability. Various forms of practical teaching activities, such as experiments, training, and internships, will enable students to deepen their theoretical knowledge of "carbon peak and carbon neutralization" in actual operations, apply the learned knowledge to practical work, and enhance their practical ability. Operative level and motivates students to constantly update their knowledge and upgrade their skills to meet the changing needs of society. Encouraging students to participate in practice projects related to "carbon peak and carbon neutralization", such as social investigation, technological innovation, and policy evaluation, can also cultivate students' ability to solve practical problems and enhance their practical ability. Introducing typical practice cases of "carbon peak and carbon neutralization" at home and abroad and organizing students to conduct in-depth case analysis and discussion are also important ways to enhance students' professional knowledge and ability to achieve "carbon peak and carbon neutralization" through quasiparticle.

4.5 Cultivating mechanism for "carbon peak and carbon neutralization" talent with a sense of social responsibility

To address the common challenge of global climate change, talent training in new liberal arts "carbon peak and carbon neutralization" needs to focus on cultivating students' sense of social responsibility. Through participation in social public welfare activities and environmental protection actions, students are led to pay attention to social issues, actively participate in the cause of "carbon peak and carbon neutralization" and contribute to society. Organizing students to participate in low-carbon living practices, including energy conservation and emission reduction, waste sorting, and green travel, can enable students to better understand the importance of low-carbon living and cultivate their low-carbon living habits and awareness.

4.6 Mechanism of international cooperation in talent training and school-enterprise cooperation and exchange mechanism for "carbon peak and carbon neutralization".

"carbon peak and carbon neutralization" is a global issue. In terms of cultivating "carbon peak and carbon neutralization" talent, it is also necessary to equip students with a global vision and global governance capabilities. Under these circumstances, allowing students to participate in international cooperation and school-enterprise cooperation plays a prominent role in

improving students' comprehensive knowledge and practical "carbon peak and carbon neutralization". The talent training of new liberal arts "carbon peak and carbon neutralization" needs to encourage students to participate in international exchange and cooperation projects to broaden their international vision, enhance cross-cultural communication skills, enhance international competitiveness, and contribute to global carbon peaking and carbon neutrality. Contribute to the achievement of the goal. However, school-enterprise cooperation is also an important way to enhance students' practical ability and employment competitiveness. Colleges and universities should establish close cooperative relationships with relevant enterprises and institutions to jointly carry out talent training in the field of "carbon neutralization", provide students with internship and practice opportunities, and promote the transformation and application of scientific research results.

4.7 Evaluation mechanism for "carbon peak and carbon neutralization" talent training

The establishment of a sound evaluation system is an important means to ensure the quality of talent training. The quality of "carbon neutral" talent training can be evaluated based on basic knowledge, interdisciplinary ability, innovation ability, practical ability, sense of social responsibility, etc., and quantitative and qualitative methods can be used to comprehensively evaluate students' achievements in "carbon peak and carbon neutralization". The comprehensive quality and ability level achieved in the study of "carbon peak and carbon neutralization". At the same time, the training program should be adjusted and optimized in a timely manner based on the evaluation results to continuously improve the quality and effect of talent training.

5. Discussion and Conclusion

Through the summary of the relevant research on talent training of "carbon peak and carbon neutralization", combined with the needs of China in the new liberal arts, the new liberal arts talent training mechanism of "carbon peak and carbon neutralization" has been designed.

5.1 New findings

The talent training mechanism of carbon peak and carbon neutralization in new liberal arts is a comprehensive, systematic and innovative talent training system that is expected to be of great use in cultivating people with basic knowledge of carbon neutrality, interdisciplinary

curriculum design, training for innovation, promotion of practical skills, and social talent. Compound talent, such as the cultivation of a sense of responsibility and the expansion of international vision, will provide strong talent support for addressing the challenge of global climate change.

5.2 Theoretical significance

At the theoretical level, in-depth study of the intrinsic relationship between new liberal arts education and "carbon peak and carbon neutralization" can enrich and improve the theoretical system of higher education and provide theoretical support for talent training in the new era. At the same time, through the construction of a new liberal arts talent training mechanism with "carbon peak and carbon neutralization" in mind, the deep integration of higher education and economic and social development can be promoted, higher education reform can be provided with new ideas and methods, and higher education reform and sustainable development in China can be promoted. This study provides strong support and a reference for development.

5.3 Practical value

At the practical level, this study is significant for promoting improvements in quality and the connotative development of higher education. Through the implementation of the new liberal arts "carbon peak and carbon neutralization" talent training mechanism, more talent for the new era with a sense of social responsibility and a spirit of innovation can be cultivated, providing a strong talent guarantee for China to achieve the goal of "carbon peak and carbon neutralization". Moreover, through the strengthening of interdisciplinary integration and the cultivation of practical ability, the comprehensive quality and competitiveness of students can be improved, and a solid foundation for their future career development can be laid. By cultivating interdisciplinary talent with the concept of "carbon peak and carbon neutralization", the awareness and actions of all sectors of society on environmental protection and sustainable development can be promoted, and a good atmosphere for the participation of the whole society can be formed. This plays an important role in promoting the sustainable development of China's economy and society and the building of a community with a shared future for mankind.

5.4 Limitations and prospects

This study is mainly from the perspective of China to carry out the research on the talent training mechanism of carbon peak and carbon neutralization in new liberal arts. For different countries and regions, perhaps the relevant measures proposed in this paper do not have a very high universality. In the follow-up study, we will use a wider range of cases to enhance the universal value of this study. On the other hand, the talent training of "carbon peak and carbon neutralization" needs to be in line with the times, we will closely follow the changes of talent demand of "carbon peak carbon neutralization" in future research, and constantly put forward new talent training measures.

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