

Research Article

Consistency Between College Major Settings and Urban Industrial Development in Zhenjiang: Analysis and Countermeasures

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Abstract

This study focuses on the alignment between Zhenjiang's university professional settings and local industrial development. It examines the structural characteristics of Zhenjiang's industries and conducts a comprehensive survey of the professional layout of local colleges and universities. In-depth analysis reveals core issues: an imbalanced professional structure and insufficient depth of industry-education integration. To address these, targeted countermeasures are proposed, including strengthening policy guidance, establishing a dynamic professional adjustment mechanism, developing brand majors, and enhancing the transformation capacity of scientific research achievements. The research aims to promote the coordinated development of local higher education and urban industries, and continuously improve the alignment between university professional settings and Zhenjiang's industrial development needs.

Keywords

Zhenjiang City, Major Programs, Industrial Development, Compatibility

1. Preface

Since their inception, higher education institutions have borne the responsibility of serving society. [1, 2] Since the reform and opening up, universities have not only provided high-quality talents to various industries but also directly participated in industrial upgrading and transformation through deep integration of industry, academia, and research, making significant contributions to the national economic and social development. [3, 4] With the transformation and upgrading of China's economic structure, the demand for high-level talents in regional economic development is increasing. [5-7] As important bases for talent cultivation, the alignment of university majors with urban industrial devel-

opment directly impacts the quality of talent cultivation and the sustainable development of the regional economy. [8-10] To enhance the alignment between major settings and industrial development, the "Guiding Opinions on Guiding Some Local Regular Undergraduate Universities to Transform into Application-oriented Institutions" issued by the Ministry of Education clearly states that universities should adjust their major structures according to the needs of regional economic and social development and strengthen the cultivation of application-oriented talents. Therefore, as one of the main forces in local industrial and economic development, universities should closely align their major settings with regional

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Received: 16 October 2025; **Accepted:** 27 October 2025; **Published:** 8 December 2025



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economic development needs and cultivate high-quality talents that meet the requirements of industrial development. [11, 12]

2. Basic Current Situation of Industrial Development in Zhenjiang City

Zhenjiang is located in the southern part of Jiangsu Province, at the crossroads of the Yangtze River and the Beijing-Hangzhou Grand Canal. It is one of the central cities in the Yangtze River Delta, serving as an advanced manufacturing base and an important port city in the region. In recent years, Zhenjiang's economic performance has been generally stable, with continuous improvement in quality and efficiency. In 2024, the city achieved a regional GDP of 554.001 billion yuan, representing a year-on-year increase of 5.9%. Specifically, the added value of the primary industry was 17.264 billion yuan, up 3.5% year-on-year; the added value of the secondary industry was 254.344 billion yuan, up 6.2% year-on-year; and the added value of the tertiary industry was 282.393 billion yuan, up 5.7% year-on-year. In 2024, three municipal-level collaborative innovation platforms for industry, academia, and research were newly established, 560 national high-tech enterprises were newly recognized, and two Chinese unicorn enterprises, 28 provincial gazelle enterprises, and 197 specialized, refined, unique, and innovative enterprises at or above the provincial level were newly awarded. Forty thousand talents with college degrees or above and 217 high-level leading talents were newly introduced. The city won 29 provincial science and technology project awards, and the output value of high-tech industries accounted for 54.7% of the output value of industrial enterprises above designated size. The city continues to promote the construction of emerging industry clusters, selecting three future industries—artificial intelligence, low-altitude economy, new energy storage, and hydrogen energy—for early layout. A "roadmap" and "task book" have been clarified, and the Yangtze River Delta large aircraft cluster and the Sunan special steel material cluster, which are involved in the construction, have been selected as national advanced manufacturing clusters. Emphasis is placed on using new technologies and new business models to transform and upgrade traditional industries. Combined with large-scale equipment updates, the empowerment of "intelligent transformation, digital transformation, network connection, and integration" has been deepened. The annual investment in industrial technological transformation reached 16.13 billion yuan, with two new national-level smart factories, 45 provincial-level smart manufacturing factories (workshops), and eight 5G factories at or above the provincial level. Seven enterprises were selected as China's top 500 private manufacturing enterprises, and seven enterprises were included in the provincial list of

leading manufacturing enterprises.

As one of the old industrial cities in Jiangsu Province, Zhenjiang boasts a solid foundation in manufacturing with a comprehensive range of industries, covering 30 out of 31 major industry categories in the national economy's manufacturing sector. In recent years, Zhenjiang has continuously promoted the strategy of strengthening the city through industry, significantly enhancing the comprehensive strength of its manufacturing sector. Leading industries such as high-end equipment manufacturing and new materials have continued to grow, and the production of key products such as new energy vehicles and lithium-ion batteries has increased significantly. At the same time, Zhenjiang has also actively promoted the intelligent upgrading and green transformation of the manufacturing industry, as well as the integrated development of manufacturing and service industries. [13] From 2021 to 2024, according to the "Zhenjiang Municipal Statistical Bulletin on National Social and Economic Development," Zhenjiang's advanced manufacturing industry has shown good growth, and the added value of high-tech manufacturing industries above a certain scale has continued to rise.

Meanwhile, Zhenjiang emphasizes the optimization of industrial layout and the development of industrial clusters. [14] By promoting the cleanup, integration, and cancellation of low-level, small-scale, scattered, and weak industrial parks below the provincial level, it facilitates the aggregation of various resources towards key parks and enhances the carrying capacity of industrial projects. Zhenjiang actively constructs a "four clusters and eight chains" industrial system, which includes the formation of two 150 billion yuan industrial clusters in high-end equipment manufacturing and new materials, two 100 billion yuan industrial clusters in life health and digital economy, as well as eight key industrial chains. Centered around the "four clusters and eight chains", Zhenjiang aims to create a highland of industrial agglomeration. In terms of developing emerging industries, Zhenjiang actively cultivates and develops emerging industries such as the digital economy and life health. Notably, the digital economy has become a new driving force for Zhenjiang's high-quality development. By gradually accelerating the construction of a digital economy industrial ecosystem, Zhenjiang aims to create a new engine for the digital economy. On this basis, Zhenjiang attaches great importance to technological innovation and talent introduction. Through measures such as strengthening guidance for enterprise industrial technology innovation projects, helping enterprises to undertake national and provincial strategic projects, introducing high-level talents such as research teams and leading talents, and promoting the construction of public service demonstration platforms for small and medium-sized enterprises, Zhenjiang continuously enhances its technological innovation capabilities and talent competitiveness.

3. Basic Situation of Professional Settings in Colleges and Universities in Zhenjiang City

Zhenjiang currently boasts 8 higher education institutions, including 4 undergraduate institutions and 4 vocational colleges, with approximately 136,000 college students. Rich in talent resources, Zhenjiang serves as a significant "rich mine" for the local economic and social development. It has established an educational system supported by traditional advan-

tageous majors and supplemented by emerging majors, providing a solid foundation for the development of the local economy and talent cultivation. [15] Zhenjiang's vocational colleges offer more than 130 majors, covering 17 major categories and 42 specialized fields; undergraduate institutions offer more than 200 undergraduate majors, covering 9 major disciplines including science, engineering, literature, economics, management, medicine, art, law, and education, with 52 specialized categories. The specific details are listed as follows:

Table 1. Basic situation of junior college professional settings in Zhenjiang City.

Three major industries	Major category	Professional Classification	Total number of majors	Proportion
Primary industry	The broad category of agriculture, forestry, animal husbandry, and fisheries	Agricultural category	8	5.93%
		Animal husbandry category	4	2.96%
		Forestry category	3	2.22%
		Fishery category	1	0.74%
	Total		16	11.85%
	The broad category of energy, power, and materials	Non-metallic materials category	1	0.74%
		Total	1	0.74%
	The broad category of light industry and textile	Light chemical industry category	1	0.74%
		Total	1	0.74%
	The broad category of biology and chemical engineering	Biotechnology category	1	0.74%
		Total	1	0.74%
Secondary industry	The broad category of food, medicine, and grain	Food category	2	1.48%
		Pharmaceutical manufacturing category	2	1.48%
		Drugs and medical devices category	1	0.74%
		Total	5	3.70%
	The broad category of civil engineering and architecture	Construction engineering management category	3	2.22%
		Architectural design category	2	1.48%
		Total	5	3.70%
	The broad category of equipment manufacturing	Automation category	11	8.15%
		Aviation equipment category	9	6.67%
		Automobile manufacturing category	6	4.44%
		Mechanical design and manufacturing category	4	2.96%
		Electromechanical equipment category	1	0.74%
		Total	31	22.96%
	The broad category of resources,	Safety category	2	1.48%

Three major industries	Major category	Professional Classification	Total number of majors	Proportion
Tertiary industry	environment and safety	Surveying and mapping geographic information category	1	0.74%
		Environmental protection category	1	0.74%
	Total		4	2.96%
	The broad category of finance and economics	Financial accounting category	4	2.96%
		Logistics category	4	2.96%
		E-commerce category	3	2.22%
		Marketing category	3	2.22%
		Business Administration category	1	0.74%
		Economy and trade category	1	0.74%
	Total		16	11.85%
	The broad category of electronics and information	Computer category	7	5.19%
		Electronic Information Category	4	2.96%
	Total		11	8.15%
	The broad category of public security and justice	Legal practice category	1	0.74%
			1	0.74%
	The broad category of public administration and service category	Office Secretary category	2	1.48%
			2	1.48%
	The broad category of transportation	Aircraft transportation category	11	8.15%
		Urban rail transit category	1	0.74%
		Road transport category	1	0.74%
		Railway transportation category	1	0.74%
	Total		14	10.37%
	The broad category of education and sports	Language category	2	1.48%
		Education category	1	0.74%
		Sports category	1	0.74%
	Total		4	2.96%
	The broad category of tourism	Travel category	7	5.19%
			7	5.19%
	The broad category of culture and art	Art and Design category	8	5.93%
			8	5.93%
	The broad category of medicine and health	Health management and promotion category	4	2.96%
		Nursing category	2	1.48%
		Medical technology category	2	1.48%
	Total		8	5.93%

Table 2. Basic situation of undergraduate professional settings in Zhenjiang City.

Three major industries	Major category	Professional Classification	Total number of majors	Proportion
Secondary industry	Engineering	Safety science and engineering category	2	0.95%
		Material category	11	5.21%
		Electrical category	4	1.90%
		Electronics and information technology category	16	7.58%
		Ocean engineering category	1	0.47%
		Chemical and pharmaceutical industry category	2	0.95%
		Environmental science and engineering category	3	1.42%
		Machinery category	18	8.53%
		Computer-related category	14	6.64%
		Architecture category	1	0.47%
		Transportation category	3	1.42%
		Energy and power category	8	3.79%
		Agricultural engineering category	3	1.42%
		Biological engineering category	1	0.47%
		Biological science category	3	1.42%
		Food science and engineering category	7	3.32%
		Civil engineering category	5	2.37%
		Instrument category	2	0.95%
		Automation category	3	1.42%
	Total		107	50.71%
Tertiary industry	Natural Science	Chemistry-related category	2	0.95%
		Mathematics category	3	1.42%
		Statistics category	3	1.42%
		Physics category	2	0.95%
	Total		10	4.74%
	Law	Jurisprudence category	1	0.47%
		Marxist theory category	1	0.47%
		Political science category	1	0.47%
	Total		3	1.42%
	Management	E-commerce category	1	0.47%
		Business administration category	11	5.21%
		Industrial engineering category	4	1.90%
		Public administration category	4	1.90%
		Public health and preventive medicine category	1	0.47%
		Management science and engineering category	11	5.21%
		Tourism management category	2	0.95%
		Logistics management and engineering category	3	1.42%

Three major industries	Major category	Professional Classification	Total number of majors	Proportion
	Total		37	17.54%
	Pedagogy	Pedagogy category	1	0.47%
		Sports Studies category	3	1.42%
	Total		4	1.90%
		Finance category	3	1.42%
	Economics	Economics category	2	0.95%
		Economics and trade category	3	1.42%
	Total		8	3.79%
		Foreign languages and literature category	12	5.69%
	Literature	Journalism and communication category	2	0.95%
		Chinese language and literature category	3	1.42%
	Total		17	8.06%
		Nursing science category	1	0.47%
		Dental medicine category	1	0.47%
	Medicine	Clinical medicine category	2	0.95%
		Pharmacy category	2	0.95%
		Medical technology category	3	1.42%
	Total		9	4.27%
		Fine arts category	2	0.95%
	Art Studies	Design studies category	8	3.79%
		Drama and film studies category	3	1.42%
		Music and dance studies category	3	1.42%
	Total		16	7.58%

According to Table 1 and Table 2, the professional settings of colleges and universities in Zhenjiang City exhibit the following characteristics: Firstly, the current range of disciplines is relatively comprehensive, aligning with the characteristics of comprehensive universities in terms of professional settings. However, the overall layout is unbalanced, with engineering majors dominating. Among undergraduate majors, the top three are mechanical engineering, electronic information, and computer science; among specialist majors, the top three are air transportation, automation, and aviation equipment. Secondly, the structure of university majors primarily corresponds to the development of the secondary and tertiary industries, with little impact on the development of the primary industry. Especially, the corresponding majors are only offered in specialized colleges and universities, which is not conducive to the cultivation of high-level talents for modern agriculture. Thirdly, there is an insufficient offering of emerging majors, while traditional majors are repeatedly

offered, and some professional markets have reached saturation.

4. Fit Analysis of College Professional Settings and Industrial Development in Zhenjiang

In recent years, Zhenjiang has launched initiatives such as the "Gathering in Zhenjiang" plan for college students and the "Returning Swans" plan for young talents. It has also successively issued policy documents such as "Opinions on Several Policies to Encourage and Support College Graduates to Work and Start Businesses in Zhenjiang" and "Implementation Plan for the Plan of Retaining College Graduates in Zhenjiang", intensifying efforts to retain college graduates in the city. However, in recent years, the number and proportion of college graduates staying in Zhenjiang have been relatively low.

Although Zhenjiang has some strong colleges and universities located in the city, they have not been able to "get the best of the situation" and have not performed prominently in the fierce "talent war" among cities. The reasons for the low proportion of college graduates staying in Zhenjiang and the insufficient contribution of colleges and universities to Zhenjiang's economic growth are undoubtedly multifaceted, but the most important is the "misalignment" between the development of both sides.

4.1. There Are Limitations in the Coverage of Majors in Emerging Fields

In order to grasp the industrial development and consolidate the industrial support of new productive forces, Zhenjiang City strives to make greater achievements in developing new productive forces according to local conditions. It has chosen three future industries, namely artificial intelligence, low-altitude economy, new energy storage, and hydrogen energy, for early layout. The Yangtze River Delta large aircraft cluster and the Sunan special steel material cluster, which it participated in the construction of, have been selected as national advanced manufacturing clusters. Faced with the demand for professionals in emerging fields, Zhenjiang universities still have limitations. Relevant majors in cutting-edge fields such as low-altitude technology and engineering, smart energy engineering, and intelligent molecular engineering that match regional development have not yet been established or applied for; there is only one university offering each of the three related majors of artificial intelligence, energy storage science and engineering, and hydrogen energy science and engineering, and the hydrogen energy science and engineering major is a newly added one with no graduates yet, which to some extent cannot meet the talent demand of the three future industries.

4.2. There Is a Mismatch Between the Subject Structure and the Industrial Structure

According to the latest data from the Bureau of Statistics, the composition of the three industries in Zhenjiang's national economy in 2023 was 3.2%, 47.6%, and 49.2%. Zhenjiang has gradually emphasized the importance of the development of the tertiary industry, shifting from its traditional focus on industry. However, the discipline structure of universities in Zhenjiang has not been adjusted in sync with the regional industrial structure, and the development of relevant majors in the tertiary industry remains stagnant. At the same time, there is also an imbalance within the majors constituting the secondary industry. The discipline structure of undergraduate institutions is mainly composed of engineering, with a relatively small proportion of science; the discipline structure of junior colleges is mainly composed of equipment manufacturing, with other light industry disciplines accounting for a relatively small proportion. The adjustment of the discipline

structure has not effectively aligned with the adjustment of the local industrial structure, affecting the employment competitiveness of graduates in local industries.

4.3. The Depth of Industry-education Integration Is Insufficient

Despite the increasing emphasis on cooperation between universities and enterprises, the depth of industry-education integration is still insufficient, and some university-enterprise collaborations suffer from a formalistic approach. In 2021, Zhenjiang issued the "Work Plan for Collaboratively Promoting the Reform of Building a New-era Industrial Worker Team", aiming to promote in-depth cooperation between secondary vocational schools and pilot areas, industries, and enterprises in the city, and to advance the integration of industry and education, as well as university-enterprise collaboration in vocational education, to jointly cultivate a team of knowledge-based, skill-based, and innovative industrial workers. However, in the actual implementation process, there still exists the problem of formalism in "bringing enterprises to campus". Various practical teaching resources are still insufficient, and after the construction of training bases and equipment updates in some universities, they cannot meet the needs of high-tech fields such as intelligent manufacturing. At the same time, the cooperation projects and modes between universities and enterprises are relatively single, lacking a diversified cooperation mechanism. Currently, most cooperation remains at the shallow level of student internships and practical training, as well as teacher secondments and training, while deep cooperation in joint research and development, achievement transformation, technical consultation, and other aspects is relatively limited. This not only restricts the transformation efficiency of university scientific research achievements but also affects the improvement of enterprise technological innovation capabilities.

5. Paths to Enhancing Zhenjiang Colleges' Professional-Industrial Alignment

To enhance the alignment between university major settings and industrial development, Zhenjiang City needs to leverage the strength of universities located in the city to facilitate technological breakthroughs, incubate achievements, cultivate talents, and upgrade industries. Conversely, the development of these universities is inseparable from the care and support of Zhenjiang City, and serving the economic and social development of Zhenjiang City is also an important aspect of their own development. To achieve this goal, it is recommended to enhance the alignment between university major settings and industrial development from the following aspects.

5.1. Strengthen Policy Guidance and Build Regional Synergy

The Ministry of Education has proposed the development directions of New Engineering, New Medicine, New Agriculture, and New Liberal Arts, aiming to encourage higher education institutions to target advantageous industries within the region and serve the upgrading and transformation of these industries. Local governments should establish a three-dimensional promotion mechanism that is demand-oriented, categorized, and targeted, coordinate planning through policy integration, and promote the tiered development of universities. At the same time, they should collaborate with leading enterprises in the industry to establish a professional construction guidance committee, develop talent training programs that are aligned with industry technical standards, and incorporate actual enterprise project cases into the curriculum system to enhance the ability to serve the regional economy. Local governments can utilize policy tools such as financial subsidies and tax incentives to guide universities in building discipline groups around national strategic industries, prioritizing the development of interdisciplinary subjects related to strategic emerging industries. Establish special funds to focus on supporting professional groups closely related to Zhenjiang's "four clusters and eight chains" industrial system, such as intelligent equipment, biomedicine, and modern agriculture. For Zhenjiang's key development industries such as aerospace and shipbuilding, implement a "one chain, one policy" special support plan and establish a dual responsibility system of "industry chain leader + discipline leader". Establish a cross-regional coordination mechanism, rely on national strategic frameworks such as the Yangtze River Delta integration, and create a policy toolbox with a four-party linkage of "government-university-industry-enterprise", connecting the demand for talents in short supply in the industry with university enrollment plans. Explore the construction of cross-regional alliances, promote the joint construction and sharing of training resources between universities in Zhenjiang and the Nanjing metropolitan area, as well as the Suzhou-Wuxi-Changzhou metropolitan area, and implement cross-administrative division teacher mutual employment and course sharing. Build a "province-city-county" three-level monitoring and evaluation system, explore a park co-construction model of "research and development outside, transformation in Zhenjiang", achieve bidirectional linkage between remote research and development and local transformation, and improve the transformation efficiency of scientific research achievements.

5.2. Establish a Professional Dynamic Adjustment Mechanism and Strengthen Demand Orientation

Universities should strengthen the construction of profes-

sional connotation, enhance the development of core majors, and focus on building key, advantageous, and distinctive majors. In combination with market demand, a "two-way matching mechanism" between industrial clusters and discipline clusters should be established. A linkage mechanism of "employment - enrollment - training" should be constructed. Enrollment plans and training programs should be adjusted based on employment data. Yellow cards indicate warnings, while red cards mean suspension of enrollment. In specific practice, a periodic management model of "3-year warning + 5-year exit" can be referred to. Majors with an employment rate below 70% for three consecutive years and a professional alignment rate of less than 50% should have their enrollment scale reduced. Majors that rank at the bottom in employment quality assessment for five consecutive years should be shut down, forcing universities to eliminate outdated majors, withdraw majors with shrinking market demand, and add emerging majors.

Regularly conduct professional assessments, adjust the discipline structure in conjunction with industry demand forecasts, and cover emerging fields. Establish a dynamic professional adjustment mechanism, add cutting-edge majors, and optimize the traditional engineering curriculum system. Establish an "industry demand index" monitoring platform, integrate data from 12 departments including the National Development and Reform Commission, the Human Resources and Social Security Bureau, and the Industry and Information Technology Bureau, and capture in real-time the labor demand, technological breakthrough directions, and capacity expansion plans of key enterprises in the "four clusters and eight chains". Through big data modeling, form the "White Paper on Industrial Talent Demand in Zhenjiang City". In terms of the transformation of traditional majors, implement the "major + digital technology" upgrade plan. Establish and improve a professional construction quality certification system, incorporating enterprise technical standards into curriculum standards. Improve the safeguard mechanism for professional adjustment, promote resource sharing among university discipline groups, and avoid redundant construction.

5.3. Focus on the Characteristics of Industrial Development and Build a Brand Specialty

While developing traditional industries, Zhenjiang is also targeting high-end manufacturing. Therefore, universities in Zhenjiang should focus on the city's industrial development characteristics and enhance their school reputation and student competitiveness by creating brand majors. In 2025, the Science and Technology Department and the Education Department of Jiangsu Province jointly drafted the "Implementation Plan for Collaborative Innovation and Development between High-tech Zones and Colleges and Universities (2025-2027) (Draft for Comments)", and based on research, initially proposed a pilot list for pairing university discipline

teams with high-tech zones. Among them, Zhenjiang High-tech Zone has targeted the shipbuilding and offshore engineering industry, and has partnered with the Ship and Ocean Engineering and Materials Science and Engineering majors of Jiangsu University of Science and Technology, as well as the Power Engineering and Engineering Thermophysics majors of Jiangsu University, to promote "two-way adaptation" between university discipline groups and high-tech zone industrial chains, and to build an innovative ecosystem tailored to local conditions. Zhenjiang universities should firmly seize this opportunity, focus on creating brand majors, accelerate the construction of characteristic major groups and industry colleges, and actively carry out interdisciplinary construction to break down disciplinary barriers and achieve mutual empowerment between talent cultivation and high-quality development of the regional economy.

5.4. Enhance the Ability to Industrialize Scientific Research Achievements

To avoid the situation of "flowers blooming inside the wall but fragrance spreading outside", how to better transform the innovation achievements of universities into industrial driving forces is one of the keys to Zhenjiang's future industrial development. To deepen the cooperation between industry, academia, and research, and smoothen the supply and demand channels between schools and enterprises, Zhenjiang City should take multiple measures to break through the "last mile" of school-enterprise cooperation. Focusing on eight key industrial chains, it should actively carry out the action of enterprises entering and stationing in universities in Zhenjiang, accelerating the transformation of university scientific research achievements in Zhenjiang. Closely adhering to the key word "innovation leadership", it strives to refine the "roadmap" of innovative development into a "construction plan" and then turn it into a "realistic picture" by accelerating the implementation of the "876" innovation leadership project for the expansion of emerging industries, cultivation of future industries, and revitalization of traditional industries. Aiming at the goal of becoming a nationally important base for the transfer and transformation of scientific and technological achievements, it should make more practical efforts in the three words of "new, special, and practical", strengthen the dominant position of enterprises in scientific and technological innovation, deepen the cooperation between industry, academia, and research, build a full-chain innovation ecosystem, invest in new industrialization, innovate organizational models, actively explore new modes of joint research between schools and enterprises, jointly explore common key technologies in the industry, work together to tackle difficult problems, break through the bottlenecks of key industry development, accelerate the deep integration of scientific and technological innovation and industrial innovation, and add new momentum to Zhenjiang's development of new productive forces tailored to local conditions.

There are certain issues in both the experience and shortcomings of the professional settings in universities in Zhenjiang City and the development of industries. In order to promote a better alignment between the professional settings in universities and industrial development, joint efforts and collaboration from the government, universities, and enterprises are needed to gradually bridge the gap between them, providing solid talent support for the "industry-driven city" strategy.

Author Contributions

Gu Meiling is the sole author. The author read and approved the final manuscript.

Funding

As officially approved, the project numbered 2025SJYB1655 bears the title "Research on the Influencing Factors and Improvement Paths of Independent College Students' Learning Initiative Under the Background of Intelligent Education." Gu Meiling serves as the Principal Investigator, and the project is hosted by Jingjiang

Conflicts of Interest

The author declares no conflicts of interest.

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