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Professional Adjustment and Withdrawal of Jiangsu Vocational Colleges Guided by Industrial Structure Adjustment

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Abstract: The development of vocational colleges is increasingly inclined towards technical training. In order to adapt to the development pace of the entire society and meet the needs of social production, vocational colleges should be guided by industrial structure adjustment, monitor and guide the alignment of their professional settings with social needs. This article studied the adjustment and withdrawal of majors in Jiangsu vocational colleges based on industrial structure adjustment, in order to timely discover and solve the problem of mismatch between professional settings and industrial demand, and promote the optimization and adjustment of professional structure. This flexible professional setting mechanism enabled vocational colleges to quickly respond to market changes and meet the talent needs of emerging industries. This article mainly used statistical surveys, Analytic Hierarchy Process, and questionnaire surveys to explore the relationship between professional adjustments in vocational colleges and changes in industrial structure in this province. The survey results showed that 70% of students majoring in artificial intelligence technology agreed that there was an impact between the two, while 15% disagreed and 15% were neutral. The vast majority of students still agreed with the impact of industrial restructuring.

1. Introduction

Jiangsu Province's vocational education has not fully considered the needs of regional key industries in its professional settings, resulting in a significant gap between professional structure and industrial structure. This mismatch affects the ability of vocational education to support the economy and industry, thereby reducing the degree of coupling. The uneven development of regions has led to unreasonable allocation of vocational education resources in some regions, further exacerbating the low coupling between vocational education structure and industrial structure. Although the Plan proposes to strengthen the leadership of the Party and government, and improve

coordination mechanisms, there are still shortcomings in the coordination and policy implementation among various departments in the specific implementation process.

The policy document jointly issued by the Jiangsu Provincial Department of Education and the National Development and Reform Commission provides clear guidance and support for the professional adjustment of vocational colleges. These policy documents not only clarify the basic requirements for professional settings, but also propose specific adjustment ideas and strategies to ensure that the professional settings of vocational colleges can effectively adapt to changes in industrial structure. In 2024, Jiangsu Province plans to add 125 new professional points and withdraw some majors that do not meet the current needs of industrial development. Jiangsu vocational colleges actively cooperate with industry enterprises and have established 32 industry led education models. These models not only provide teaching, but also include functions such as production, research and development, and innovation and entrepreneurship. This model of integrating industry and education helps students gain practical work experience and improve their competitiveness in employment.

In the context of industrial restructuring, vocational colleges need to adjust their professional settings in a timely manner according to market demand and industry development trends, in order to cultivate more talents that meet social needs. According to the new trends and trends in industrial development, the professional settings are adjusted and the pertinence and practicality of talent cultivation are improved. The withdrawal of outdated and surplus majors from vocational colleges, optimization of educational resource allocation, and investment of limited resources into more promising professional fields have improved the quality of education. To some extent, the employment rate of graduates is increased and the employment pressure is alleviated. The adjustment of industrial structure has driven innovation in the field of vocational education, which helps to promote the development of regional economy.

This article first elaborates on the background of vocational education, analyzes the current problems in vocational education, and elaborates on the planning and role of the 2024 Jiangsu New Development Policy Document. Secondly, this article reviews the theories of other scholars on industrial structure and vocational education, and presents the arguments presented in this article. Then, in the methodology section, this article briefly analyzes the industrial structure adjustment layout of Jiangsu, conducts a data survey on the revocation/suspension of vocational high school professional points nationwide, and applies Analytic Hierarchy Process to obtain the influencing factors of professional adjustment and withdrawal. In the fourth part, this article conducts a questionnaire survey on the adjustment of majors in Jiangsu vocational colleges, and draws data and conclusions. In the summary section, this article proposes suggestions.

2. Related Works

The coupling between the structure of vocational education and industrial structure in Jiangsu Province is at a high level, but there is a moderate or serious imbalance in coordination. This means that although there is a certain degree of integration between the structure of higher vocational education and the industrial structure, further optimization and adjustment are still needed to achieve a higher level of coordinated development.

Some people have made relevant discussions on industrial structure. For example, Jing Li et al. examined the relationship between industrial structure adjustment, technological progress, and environmental improvement, explored whether these two factors have a positive contribution to environmental quality, and provided empirical evidence on the impact of industrial structure and technological progress on the environment, but lacked a comprehensive analysis of the specific mechanisms that affect environmental outcomes [1]. In terms of environmental regulation,

technological innovation, and industrial structure upgrading, Yin K studied the interaction between these three factors. He emphasized the crucial role of environmental regulations in promoting technological progress and industrial upgrading, but did not fully explore regional or sectoral differences in the effectiveness of environmental regulations and their impact on technological innovation and industrial structure [2]. Chan-Yuan Wong's focus was on the Taiwan Institute of Industrial Technology and its role in developing semiconductor technology, shaping industry niches, and configuring new industrial structures [3]. There is a non-linear relationship between digital inclusive finance and industrial structure upgrading. Shuping Lin analyzed how digital finance promotes industrial transformation, which helped to understand how digital financial services can promote industrial development by providing accessible financial tools [4]. The digital economy has impacted China's manufacturing industry. Xiaoyan Ren focused on green transformation and comprehensively analyzed how digital technology promotes innovation and environmental sustainability in the manufacturing industry. He also studied the dual impact of the digital economy on technological innovation and industrial structure optimization in China's manufacturing industry [5]. Bin Xi discovered the relationship between China's economic growth, industrial structure upgrading, and environmental pollution, providing empirical evidence for these interrelated factors [6]. From a technical and economic perspective, Akihiro Yoshimura analyzed the material flow of indium in Japan and its relationship with industrial structure transformation [7]. Axel Jacob et al. elucidated the impact of gamification on the macro and micro social structures within industrial organizations, suggesting that it plays a certain role in organizational dynamics and individual behavior. They intended to strategically utilize gamification to improve organizational performance and employee engagement [8]. Sylvia Andriamaharosoa used dynamic Bayesian networks to detect and analyze the causal structure of risks in industrial systems, aiming to improve risk management strategies and enhance security and operational efficiency for risk scoring in complex industrial environments [9]. Benjamin H. L emphasized the strategic application of standards in promoting industrial transformation and innovation as the determining factors for improving China's industrial structure through standards [10]. Some scholars have also studied the majors of vocational colleges. To provide a framework for improving the career guidance system in higher education, Anwar M et al. discussed the development of a career choice assistance system for engineering students in higher education [11]. Yulianty E believed that utilizing project-based learning in vocational schools to improve writing skills among tourism majors, with a focus on its implementation and outcomes, can enhance the outcomes of vocational education [12]. To improve language education, Abidah L proposed specific needs and requirements for vocational schools to design effective English textbooks, and to develop more targeted and effective English textbooks [13]. Suranto S stated that the strategic efforts made by vocational high schools to adapt to the ASEAN Economic Community focus on education reform and internationalization strategies [14]. Chuane Q investigated the relationship between English language testing motivation and grades of Chinese vocational school students, identified key motivational factors that affect language learning outcomes, and provided information for educational strategies and policies [15]. Zidni Z F K S developed a vocabulary digital pocket book for vocational high school online business and marketing students, and applied a practical tool to support language learning in the professional environment, aiming to improve language skills related to the field [16]. Allen Kuyenga M C explored racial positive methods in vocational and technical education to enhance students' abilities and bridge the gap of occupational liberalism [17]. Riska M cultivated and developed productive teachers in Sigli to enhance the work skills of vocational high school students [18]. Fiandini M aimed to develop a cognitive assessment tool suitable for vocational high school Merdeka courses, measuring and improving students' cognitive abilities [19]. In order to better adapt to the adjustment of industrial structure, vocational colleges should closely monitor market dynamics, strengthen industry university research

cooperation with enterprises, and adjust and optimize professional settings.

3. Methods

3.1 Adjustment of Industrial Structure

In terms of manufacturing, Jiangsu is particularly prominent in high-end equipment manufacturing and intelligent manufacturing, and is gradually transitioning towards high-end and intelligent manufacturing. The service industry occupies an important position in Jiangsu's economy, especially with the rapid development of modern service industries such as finance, logistics, and information technology. Jiangsu actively promotes the construction of modern agriculture, emphasizing the application and promotion of agricultural technology. By applying advanced planting techniques, management concepts, and agricultural machinery, Jiangsu's agricultural production efficiency has been significantly improved, and the quality of agricultural products has also been significantly improved. This province also relies on rich historical and cultural heritage and unique Jiangnan water towns to vigorously develop creative industries and cultural tourism. The southern region of Jiangsu is dominated by high-tech industries and modern service industries. The central Jiangsu region adheres to a development strategy that emphasizes both manufacturing and agriculture, while also emphasizing industrial upgrading. Relying on abundant resources and labor advantages, the northern Jiangsu region vigorously develops emerging industries such as new energy, new materials, energy conservation and environmental protection.

3.2 Relevant Investigation on Vocational Majors

Jiangsu Province has established a mechanism for connecting professional construction with industrial structure adjustment, issuing warning reports every 2-3 years to ensure that the professional structure of vocational education is highly consistent with the industrial structure. Guided by the adjustment of industrial structure, various mechanisms and measures are taken to ensure a high degree of matching between professional settings and industrial demand, thereby improving the quality of education and employment rate. This series of adjustments and optimizations not only contribute to the development of vocational colleges themselves, but also provide strong support for local economic and social development. This article collects data on the revocation/suspension of majors in vocational colleges nationwide, as shown in Table 1.

It can be found that the number of professional points revoked in automotive manufacturing and testing technology, marketing, automotive technology services and marketing is relatively high. The number of professional points revoked in application of electronic technology, mold design and manufacturing, construction project management, midwifery, building decoration engineering technology, international business, air crew, engineering cost, chain operation and management, modern secretarial, CNC technology and construction project supervision is also over 20.

In 2024, Jiangsu Province plans to add 125 five-year higher vocational education majors, including the application of artificial intelligence technology, elderly care and management, new energy vehicle testing and maintenance technology, and industrial robot technology. The IoT application technology major relies on the resource integration platform of the National IoT Industry Education Alliance, the professional co construction platform of the New World IoT College, and the "IoT Integration and Innovation" training platform, hoping to enhance students' practical operation and innovation abilities. By collaborating with major platforms and continuously optimizing course offerings and training facilities, it is ensured that students can master the latest Internet of Things technologies and applications.

Through school enterprise cooperation and the construction of practical training platforms,

students can gain practical experience in the actual work environment, thereby improving their adaptability to employment positions. The school organizes employment resources to connect with students, allocates internship resources, and helps students better adapt to the job market through methods such as slow employment and slow employment.

Table 1: List of revocation/suspension of enrollment in vocational colleges

Major	Number of specialty points (2023)	Number of specialty points (2024)	Revocation/ Suspension quantity
Automotive manufacturing and testing technology	690	635	55
Marketing	910	862	48
Automotive technology services and marketing	324	284	40
Applied electronic technology	348	309	39
Mold design and manufacturing	279	247	32
Construction project management	379	350	29
Midwifery	333	305	28
Architectural decoration engineering technology	376	351	25
International business	129	105	24
Air crew	597	574	23
Engineering cost	856	833	23
Chain operation and management	155	132	23
Modern secretaries	184	162	22
CNC technology	640	619	21
Construction project supervision	115	94	21
Automotive electronics technology	135	116	19
Wealth management	140	122	18
Real estate operation and management	65	47	18
Politics of the firm	358	340	18
Business English	432	414	18
Primary school English education	163	145	18

Note: https://www.sohu.com/a/774520494_451178

3.3 Hierarchical Analysis of Professional Adjustment and Exit

This article conducts a hierarchical analysis of the influencing factors of professional adjustment and exit, determines the weights of each factor, and evaluates their importance. The primary indicators include academic interests, career prospects, personal abilities and strengths, social and family influence, education quality and resources, mental health and adaptability, policy environment, and economic factors. The secondary indicators include academic passion, personal interest, and understanding and comprehension of the subject; employment rate, industry development trends, salary levels, and promotion opportunities; self-cognition, skill matching, innovation ability, and learning ability; teaching quality, experimental facilities, faculty, and library resources; suggestions from family and friends, social beliefs, and family economic status; stress tolerance, adaptation to new environments, and personal mental health; education policies, scholarship policies, and study abroad policies; tuition costs, living expenses, scholarships, and

funding opportunities.

This article applies the Analytic Hierarchy Process to analyze its factors. Firstly, a judgment matrix is constructed:

$$x_{ik} = \frac{1}{x_{ki}} \tag{1}$$

x_{ik} represents the comparison of the importance of element i and element k. Single level sorting is performed to verify consistency:

$$CI = \frac{\eta - \mathrm{m}}{m-1} \tag{2}$$

Measuring consistency requires applying random consistency:

$$RI = \frac{CI_1 + CI_2 + \cdots + CI_{\mathrm{m}}}{m} \tag{3}$$

If the test coefficient CR:

$$CR \prec 0.1 \tag{4}$$

Then, the judgment matrix has consistency.

In order to explore the influencing factors of professional adjustment, this article invites 10 experts from the education industry to rate the influencing factors of professional settings in vocational colleges.

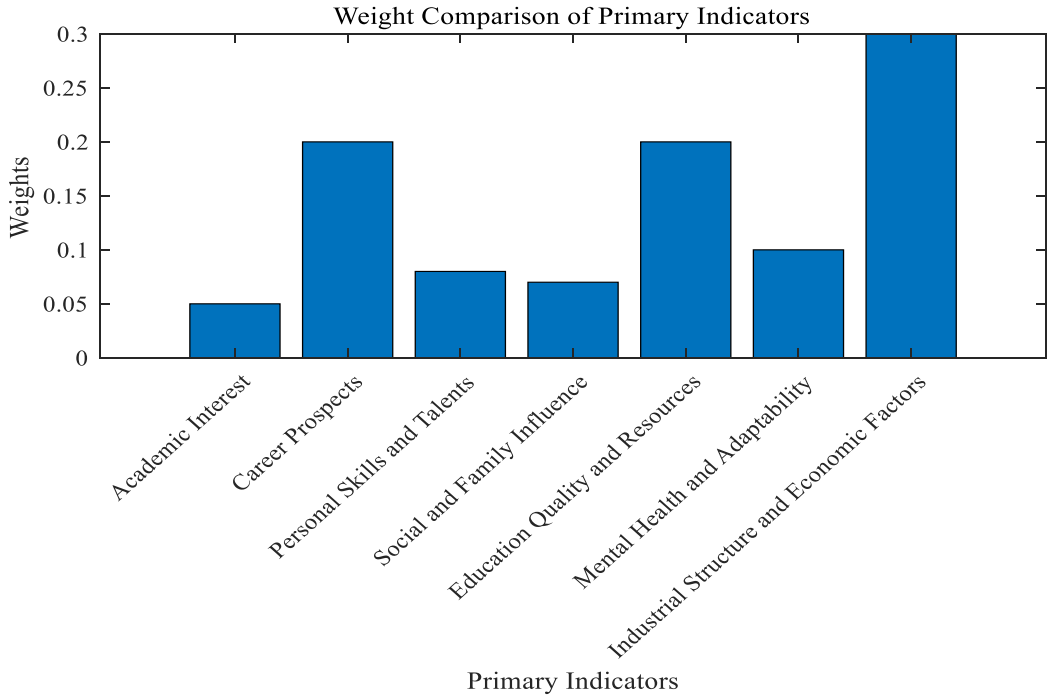

Figure 1: Comparison of weight values of primary indicators

As shown in Figure 1, this article can find that the weight value of industrial structure and economic factors is the highest (0.3), while academic interest is the lowest, with a weight value of 0.05. The weight values of education quality, resources, and employment prospects are the same,

indicating that the impact of these two factors is equal and accounts for a large proportion in the professional assessment of vocational colleges. The influence of individual abilities and strengths, social and family influence, and psychological health and adaptability have relatively small weights. It can be seen that the establishment of majors is not closely related to internal factors, but rather to actual economic and material development. Therefore, the establishment of vocational majors needs to be fully practical.

4. Survey on Professional Adjustment in Jiangsu Vocational Colleges

4.1 Data Sources

Based on the GDP and industry proportion of Jiangsu Province in 2023, this article concludes that its GDP ranks second in the country, and the manufacturing industry is the most important part of the real economy. The industrial development system in Nanjing, Jiangsu can be summarized as four pillars and eight chains. The automotive industry, steel industry, petrochemical new materials industry, and electronic information manufacturing industry occupy important positions. Software and information services, new energy vehicles, new medicine and life health, integrated circuits, artificial intelligence, smart grids, rail transit, intelligent manufacturing equipment, etc., are all the links under its pillars. Intelligence, health, and environmental protection have become the professional development directions in this area. Among the newly added specialties in 2024, there are many in the field of intelligence, and specialties in elderly care, rehabilitation and wellness, and cross-border e-commerce are also increasing.

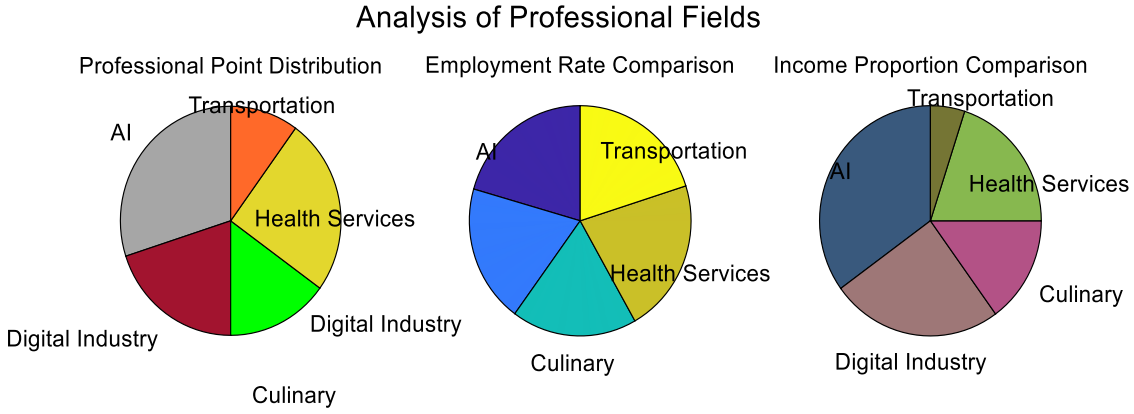

Figure 2: Setting of professional points in higher vocational education in Jiangsu Province

As shown in Figure 2, this article can see that the proportion of artificial intelligence related majors is relatively high in vocational colleges, and their income level is also relatively high. This indicates that the industry trend related to artificial intelligence is positive and highly valued. Overall, there is not much difference in employment rates among majors related to artificial intelligence, digital industry, cooking and catering, health services, and transportation, but there is a significant difference in salary and benefits. Compared to other industries, the income level of artificial intelligence and digital industries is higher, and there are more specialized areas in these two areas. The proportion of health service majors has also increased, and their employment rate and salary level are also good. Modern people are increasingly valuing health preservation. An increasing number of elderly people have led to the development of service industries for the elderly.

4.2 Questionnaire Development

In order to further explore the impact of industrial structure adjustment on vocational colleges in Jiangsu, this article also applies a questionnaire to survey local vocational colleges and collect personal experiences of vocational college students. The content of this questionnaire includes: Q1: basic information of the respondents (name, gender, grade, major), Q2: sense of identity with their profession, Q3: understanding of industrial structure adjustment in the province, Q4: sense of identity with the impact of industrial changes on professional settings, etc. This questionnaire adopts online mode and invites students from vocational colleges in the province to come and answer. The questionnaire survey lasts for one week, and according to statistics, there are 876 valid questionnaires. The actual number of questionnaires filled out is 1000, and the effective rate of the questionnaire is 87.6%. This article presents data on students' answers to the fourth question.

4.3 Results

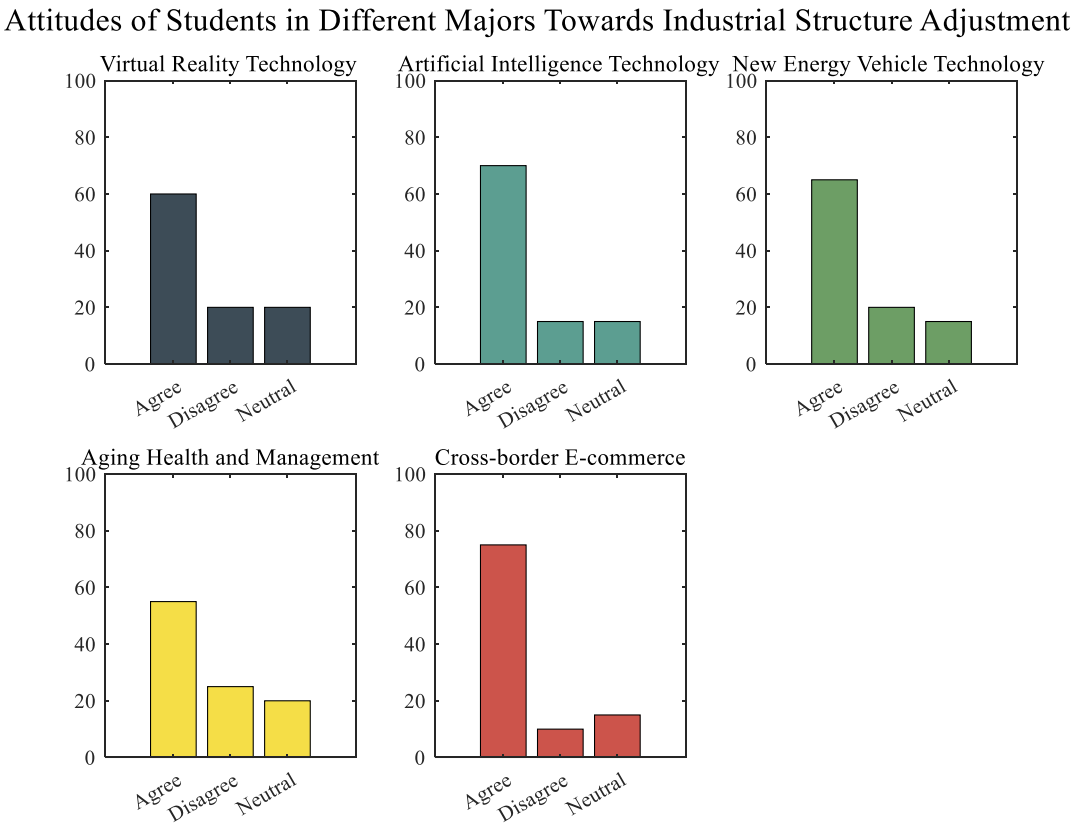

Figure 3: The adjustment of industrial structure among students from different majors in vocational colleges

As shown in Figure 3, this article finds that 60% of students majoring in virtual reality technology believe that the adjustment of professional structure affects professional settings, and the proportion of maintaining neutrality and disagreement is consistent. 65% of students majoring in new energy vehicle technology agree with the relationship between the two, while 20% of students do not agree with this relationship. 75% of students majoring in cross-border e-commerce agree, while 10% disagree.

5. Conclusions

Based on the above survey, this article believes that current students do not have a clear understanding of the relationship between industrial structure adjustment and professional adjustment and exit. Therefore, the following suggestions are proposed: based on the key industry needs in Jiangsu region, closely related to the framework of higher education majors, early warning and dynamic adjustment mechanisms should be established to ensure a high degree of consistency between majors and industrial structures. Investment in vocational education and training in underdeveloped areas is increased to improve infrastructure, enhance the overall strength of teaching labor and curriculum skills, and achieve balanced development between regions. By supporting and regulating the development of vocational education and training through social forces, the participation of vocational schools is promoted, and mixed ownership is reformed in various ways. The cooperation with industrial parks is strengthened to create more mixed ownership vocational schools. The development, education, human resources, and social security reform departments in various regions must maintain the leadership of the Party and government committees, improve coordination mechanisms, and ensure effective policy implementation.

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References

[1] Jing Li, Jia Wang, Bo Zhang: Are Industrial Structure Adjustment and Technical Progress Conducive to Environmental Improvement? J. Glob. Inf. Manag. 2022, 30(6): 1-17.
[2] Yin K, Miao Y, Huang C. Environmental regulation, technological innovation, and industrial structure upgrading. Energy & Environment, 2024, 35(1): 207-227.
[3] Chan-Yuan Wong, Jui-Jan Chan: How Public Research Institutions Propagate Industrial Niches and Configure New Industrial Structure: The Case of ITRI (Taiwan) for Semiconductor Technologies. Computer, 2024, 57(5): 39-43.
[4] Shuping Lin, Wenhui Ma: Digital Inclusive Finance and Industrial Structure Upgrade - Based on Nonlinear Relationship Perspective. J. Adv. Comput. Intell. Intell. Informatics, 2023, 27(2): 251-258.
[5] Xiaoyan Ren, Xiaoqi Qin, Yaning Li, Ye Tian: Impact of the Digital Economy on the Green Transformation of China's Manufacturing Industry: A Dual Perspective of Technological Innovation and Industrial Structure Optimization. J. Glob. Inf. Manag.2023, 31(6): 1-22.
[6] Bin Xi, Pengyue Zhai: Economic growth, industrial structure upgrading and environmental pollution: evidence from China. Kybernetes, 2023, 52(2): 518-553.
[7] Akihiro Yoshimura, Yuma Nishioka, Yasunari Matsuno: Analysis of Substance Flow and the Transition of Industrial Structure of Indium in Japan. Int. J. Autom. Technol. 2022, 16(6): 747-755.
[8] Axel Jacob, Andreas Faatz, Lars Knüppe, Frank Teuteberg: The Impact of Gamification on Macro- and Micro-level Social structures - The Case of an Industrial Organization. Int. J. Hum. Comput. Interact. 2022, 38(7): 614-630.
[9] Sylvia Andriamaharosoa, Stéphane Gagnon, Raul Valverde: Detecting the Causal Structure of Risk in Industrial Systems by Using Dynamic Bayesian Networks. Int. J. Inf. Technol. Syst. Approach, 2022, 15(1): 1-22.
[10] Benjamin H. L. Tzeng, Ming-Yeu Wang, Shiuh-Sheng Hsu, Benjamin J. C. Yuan: Determinants of Using Standards to Upgrade Chinese Industrial Structure From the Context of Sectoral System of Innovation. IEEE Trans. Engineering Management, 2022, 69(5): 1891-1901.
[11] Anwar M, Effendi H, Darni R. Development of Engineering Vocational Choice Systems in Higher Education. Journal Of Informatics And Telecommunication Engineering, 2023, 6(2): 570-578.
[12] Yulianty E, Al Farhan M. Project-based learning for teaching writing skill at tourism major in vocational school[C]//Proceeding of Undergraduate Conference on Literature, Linguistic, and Cultural Studies. 2023, 2(1): 272-281.
[13] Abidah L, Askangela M L, Berlianty D, et al. A study on needs to design English teaching materials at vocational school. Journal of English Language Teaching Innovations and Materials (Jeltim), 2023, 5(1): 69-90.

[14] Suranto S, Rahmawati L, Rohmah W, et al. Vocational High School Strategic Efforts in Dealing with ASEAN Economic Communities. Jurnal Paedagogy, 2023, 10(2): 343-353.
[15] Chuane Q, Shukor S S, Yuehong T, et al. The relationship between motivation and English language test performance among secondary vocational schools' students in China. Studies in English Language and Education, 2023, 10(1): 280-302.
[16] Zidni Z F K S, Mubarok T A. Development Vocabulary Digital Pocket Book to Online Business and Marketing (OBM) Students at Vocational High School Level. English Education: Journal of English Teaching and Research, 2023, 8(1): 30-42.
[17] Allen Kuyenga M C, Lachney M, Green B. Race-positive career and technical education: Techno-social agency beyond the vocational-liberal divide. TechTrends, 2023, 67(3): 446-455.
[18] Riska M, Khairuddin K, Usman N. Training and Development of Productive Teachers in Improving Work Skills for Vocational High School (SMK) Level Students in Sigli. International Journal of Engineering Business and Social Science, 2023, 1(06): 616-628.
[19] Fiandini M, Hofifah S N, Ragadhita R, et al. How to make a cognitive assessment instrument in the merdeka curriculum for vocational high school students: A case study of generating device materials about the stirling engine. ASEAN Journal for Science Education, 2024, 3(1): 65-86.