PIONEER
ACADEMIC PUBLISHING LIMITED

Journal of Advanced Research in Education
ISSN 2709-3980
www.pioneerpublisher.com/jare
Volume 2 Number 3 May 2023

The Experience and Inspiration of Japanese Vocational Schools: The Example of Kobe Institute of Computing

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doi:10.56397/JARE.2023.05.12

Abstract

The history of vocational schools in Japan is short, but they have developed rapidly and have provided a large number of professional talents for the development of Japanese economy. Kobe Institute of Computing has remained strong despite the declining birth rate and unstable economic conditions in Japan. The author analyzes and discusses the basic situation and characteristics of its profession, curriculum, and educational philosophy, which is of great practical significance and reference for the development of higher vocational education in China.

Keywords: Japan, vocational schools, schooling experience, Kobe Institute of Computing

1. Overview of Japan's Vocational Schools

Since the Meiji Restoration, Japan has vigorously developed vocational education, and the development of vocational education has driven the growth of Japan's economy. Regarding Japan's vocational education, it is divided into junior colleges, specialized higher education institutions, specialized training colleges, and specialized vocational universities which were established in 2019. Among them, specialized training colleges under the category of specialized training schools (schools that offer specialized courses) have a short history but have developed rapidly. They belong to higher vocational education and Japan is among the developed countries in this field. The curriculum of specialized training colleges is different from that of universities and graduate schools. Universities and graduate schools mainly cultivate research-oriented talents, while vocational schools focus more on vocational education, similar to vocational schools and colleges in China. The purpose of vocational schools is to cultivate students' necessary professional skills in practical life. The subjects involved are distributed in eight fields: industry, agriculture, medical services, health services, education and social welfare, business, clothing and housekeeping, and cultural education. Vocational schools have great flexibility, and people from all walks of life can study to acquire professional knowledge, skills, and related certificates to facilitate future employment. The length of vocational school courses is usually two years, but there are also three to four year courses. Students who reach a course of 1,700

hours or above and pass the relevant exams can be awarded the title of "Specialist," and those who reach a course of 3,400 hours or above can be awarded the title of "Senior Specialist." Students who obtain the "Specialist" qualification can further advance to universities and those who obtain the "Senior Specialist" qualification have the qualification to take the entrance examination for graduate schools. This provides vocational school graduates with multiple opportunities for continuing their education at universities or graduate schools instead of just opting for employment.

Since entering the 21st century, Japan has faced the crisis of an aging population, declining birth rate, economic downturn, and the impact of the COVID-19 pandemic, which has posed severe employment challenges for young people. These challenges have also impacted vocational schools.

2. Current Research on Japan's Vocational Education

Domestic research on Japan's vocational education mainly focuses on its historical development and characteristics, as well as the enlightenments and lessons that can be learned and applied to China's vocational education. Gao Jianning and Huang Liwen's (2003) analysis of Japan's post-war higher vocational education policy and system provides insights into China's higher vocational education. Liu Wenjun's (2007) analysis of the relationship between Japan's secondary vocational education and economic development, and changes in the employment prospects of high school graduates, explores Japan's experiences and lessons learned, and provides insights for China. Sang Fengping's (2012) analysis of Japan's experiences and measures in promoting industrial development through vocational education provides a useful reference for talent reserves and optimizing and upgrading China's industries through vocational education. Research on Japan's specialized training colleges was relatively focused on at the beginning of the 21st century. However, in recent years, there has been less attention paid to Japan's specialized training colleges, especially specific local vocational schools, and the scope of related research has been small. Wang Yunxiang's (2005) analysis of the overall curriculum setting and operational philosophy of specialized training colleges draws on experiences that China can apply toward developing vocational education. Gong Xiaoqing and Wu Bing's (2008) systematic introduction of Japan's specialized training colleges summarizes its successful experiences and provides insights for addressing various issues faced by China's vocational education, such as training objectives, majors, curriculum settings, teacher development, and quality of student intake. Liu Fei's (2017) analysis of the characteristics of entrance examinations for Japan's Industrial College of Technology provides insights for China's higher vocational education.

Japan's academic prejudice against vocational education has led to relatively little research on vocational education in Japan. The relevant research mainly focuses on the characteristics of the system or future prospects of vocational education. Tomoka Tsuchimoto's (2008) categorization of the diversity of specialized training colleges into three aspects: institutional features, features of the creators and their relations with the labor market, and her projections for specialized training colleges' character and execution in practice, contributes to a better understanding of specialized training schools in Japan. However, there is little research on specific local vocational schools, and current research mainly focuses on their geographical location and the proportion of students who advance to universities. Shino Uehara and Hinako Suzuki's (2020) analysis of the actual situations of vocational schools in Nagasaki and Yamagata prefectures, based on the vocational education of local youth, represents a recent example of research on specific local vocational schools.

3. Majors and Curriculum and Educational Philosophy of Kobe Institute of Computing

Kobe Institute of Computing was founded in 1958 and holds an authoritative position in the field of computers. In addition, while operating a specialized school, the school corporation, Computer Comprehensive School also owns a specialized graduate school - Kobe Institute of Computing Graduate School of Information Technology, which enables students to advance their studies internally. This is even rare in Japan. The school has made remarkable achievements in the integration of industry, academia, and research and has participated in the "ABE Initiative" project, which is one of the important policies of the Japanese government. Kobe Institute of Computing has received the most national scholarship students from the Japanese

universities of science. The school maintains cooperative relationships with over 400 companies and has remained steadfast even in the situation of Japan's low birth rates and unstable economy, with a graduate employment rate of over 95%.

3.1 Majors

Kobe Institute of Computing aims to popularize electronic science and develop industrial activities that utilize digital and information technology. It provides professional education to high school graduates, or those who are considered to have the equivalent educational capacity in related fields. Furthermore, the school also provides Japanese language education to international students to facilitate their entry into specialized education institutions or to assist them in employment in relevant fields.

The majors of Kobe Institute of Computing can be divided into four modules: information engineering, design, entertainment, and specialized courses exclusively for international students. Information engineering includes IT (2-4 years), hardware (2 years), and business (2 years). Design includes building and interior design (2 years), industrial design and 3D CAD graphics (2 years), and web and graphic design (2 years). Entertainment includes game programming (2-4 years), 3DCG animation and audiovisual production (2 years), original drawing, animation and coloring (2 years), dubbing and performing (2 years), sound production, sound effects and digital music (2 years), and audio technology, lighting, and audio playback (2 years). Finally, there are specialized courses exclusively for international students, which are divided into two categories: international exchange subjects (2 years) and Japanese language subjects.

The above majors are further subdivided into specialized courses. For example, the IT major in information engineering includes information processing and AI system development subjects for the 2-year program, IT technician for the 3-year program, and IT specialist for the 4-year program. Building and interior design major in design includes building design and interior design subjects. Majors of Kobe Institute of Computing are characterized by strong relevance and detailed curriculum division. At the same time, different majors focus on different learning content in each academic year. Taking game programming in entertainment as an example, the first year is aimed at entering the game industry, thoroughly learning programming and other basic knowledge. The second year is dedicated to 3D game programming, Android internships, and actual game production. The third year focuses on the training of actual game programming programs, and through comprehensive course learning, the student's skills are improved. In the fourth year, students study the latest development techniques and cultivate their programming abilities for the future. Through systematic basic learning to professional depth, Kobe Institute of Computing develops and unleashes students' unlimited potential. It attaches great importance to the combination of knowledge, ability, and career through extensive internship cooperation with the gaming industry. Graduates of game programming have overwhelming employment advantages in IT or gaming industries.

3.2 Curriculum

The curriculum at Kobe Institute of Computing is divided into industrial specialized courses and cultural and educational specialized courses. There are 13 special courses in the industrial specialized courses and 9 specialized courses in the cultural and educational specialized courses, as shown in the table below:

Table 1.

Curriculum	Courses	Length of Schooling
Industrial specialized courses	Information Processing Discipline	2 years
	AI System Development Discipline	2 years
	IT Technician Discipline	3 years
	IT Expert Discipline	4 years
	Information Engineering Discipline	2 years
	E-commerce discipline	2 years
	Game Software Discipline	2 years
	Entertainment	3 years

	Software Discipline	
	Game Development Research Discipline	4 years
	Architectural Interior Design Discipline	2 years
	Industrial Design Discipline	2 years
	International Exchange Discipline	2 years
	Comprehensive Research Department	1 year
Cultural and educational specialized courses	Graphic Design Discipline	2 years
	3DCG Animation Discipline	2 years
	Digital Animation Discipline	2 years
	Sound Production Discipline	2 years
	Sound Technology Discipline	2 years
	Dubbing talent Discipline	2 years
	Japanese language 2-year Course	2 years
	Japanese language 1-year and 6-month Course	1 year and 6 months
	Japanese language 1-year and 9-month Course	1 year and 9 months

Source: Kobe Institute of Computing Official Website - School Basic Information

It can be seen from the table that the courses offered by Kobe Institute of Computing are mainly two years long, while the industrial specialty course is three to four years long. Students who choose the industrial specialty course and meet certain conditions can obtain the title of "Advanced Specialist," while those in the industrial or cultural and educational specialty courses who choose the two-year course and meet certain conditions can become "Specialists". The industrial specialty course and the cultural and educational specialty course have two main types of courses: required courses and elective required courses. Most subjects only have required courses, while some set elective required courses. The specific course schedules are as follows: Figure 1 shows the education curriculum for the two-year information processing course, with 12 required courses in the first and second years and an additional six elective required courses, three in each semester, for students to choose according to their own interests and basic knowledge, as long as they meet the necessary requirements of 1700 hours of course time within two years, providing a certain degree of flexibility. Figure 2 shows the curriculum for the two-year information technology course, with 9 required courses in the first year and 5 in the second year, with a total of 850 hours of course time each year. The average number of course hours for each required course in the second year is higher than that in the first year, with exercises and internships comprising 68% of the second year's course time, indicating that the information technology program values the combination of practice and knowledge and regards both as required courses, emphasizing both the teaching of fundamental knowledge and the cultivation of students' practical ability.

In general, the industrial specialty course and the cultural and educational specialty course have a total of 22 subjects, 9 of which have elective required courses, accounting for 40.9% of all subjects. There are 6 subjects with elective required courses in the industrial specialty course, accounting for 46.2% of the industrial specialty course, and the proportion of subjects with elective required courses in the three or four-year programs is 100%. There are 3 subjects with elective required courses in the cultural and educational specialty program, accounting for 33.3% of the cultural and educational curriculum. The flexibility of elective required courses in the industrial specialty course is higher than that in the cultural and educational specialty course, as the subjects in the engineering specialty program involve a wide range of content, which can be adjusted according to the direction of students' interests. In addition, all of the subjects that involve exercises or internships account for 100% of all subjects, indicating that the school attaches great importance to the training of practical personnel and that theoretical courses serve practical needs, making it easier for students to find employment. Furthermore, there are also

exercise-related required courses for Japanese language education for international students, allowing them to use Japanese as a tool and provide experience for further study or entry into related fields.

Table 2.

Classification	Subjects	Year	Class hour		Class hour in 1 year
			First semester	Second semester	
Required course	Exercises	1	17	34	51
Required course	AI literacy	1	17	17	34
Required course	Programing I	1	68		68
Required course	Application	1	34		34
Required course	Algorithm	1	51		51
Required course	C language I	1	85		85
Required course	ICT introduction	1	153		153
Required course	Programing II	1		68	68
Required course	Exercises in program design	1		85	85
Required course	Qualification measures I	1		68	68
Required course	C language II	1		85	85
Required course	ICT special lecture	1		68	68
Subtotal			425	425	850
Required course	Career design	2	34	34	68
Required course	Network technology	2	34	34	68
Required course	Database technology	2	34	34	68
Required course	Document technology	2	17		17
Required course	Programing III	2	85		85
Required course	Linux I	2	85		85
Required course	Qualification measures II	2	68		68
Required course	Programing IV	2		85	85
Required course	Linux II	2		51	51
Required course	IoT basic	2		34	34
Required course	Practical training	2		85	85
Elective required course	C# I	2	68		68
Elective required course	Network construction I	2	68		68
Elective required course	Python	2	68		68
Elective required course	C# II	2		68	68
Elective required course	Network construction II	2		68	68
Elective required	AI introduction	2		68	68

course					
Subtotal			561	561	1122
Total			986	986	1972
Total number of class hours necessary for completion of a course					1700

*It' s assumed that the selection required for second year is 136 hours (68 hours for first semester, 68 hours for second semester).

Source: Kobe Institute of Computing Official Website - School Basic Information

Table 3.

Classification	Subjects	Year	Class hour		Class hour in 1 year
			First semester	Second semester	
Required course	Electrical mathematics	1	34	34	68
Required course	Basic culture	1	17	17	34
Required course	Analogue design	1	51	51	102
Required course	digital design	1	68	68	136
Required course	C language	1	51	51	102
Required course	Program I	1	51	51	102
Required course	Microcomputer basics	1	51	51	102
Required course	Microcomputer control I	1	85	85	170
Required course	AI literacy	1	17	17	34
Subtotal			425	425	850
Elective required course	Program II	2	68	68	136
Elective required course	Design program	2	85	85	170
Elective required course	Practical training	2	136	136	272
Elective required course	HDL	2	34	34	68
Elective required course	Microcomputer control II	2	102	102	204
Subtotal			425	425	850
Total			850	850	1700
Total number of class hours necessary for completion of a course					1700

Source: Kobe Institute of Computing Official Website - School Basic Information

3.3 Education Philosophy (Business Philosophy) and Education System

3.3.1 Education Philosophy

The education philosophy of Kobe Institute of Computing is to cultivate specialized professionals with humanity and taste. The graduates also possess "unfailing power." The school requires all teachers to follow the following business philosophy as the school's business policy:

(1) Mission: We train specialized professionals with humanity and taste.

(2) Values: Honesty: Work diligently and sincerely.

Growth: Self-learning and implicit learning at work.

Creativity: Engage in meaningful and valuable work.

(3) Ideal: Graduates who receive praise and are confident in their lives are active in all social occasions, becoming a highly recognized and capable school by everyone.

This philosophy is not only deeply ingrained in the teachers, but also deeply understood and internalized by students of Kobe Institute of Computing from the beginning of their studies. This belief will not wither even 20 or 30 years after graduation.

3.3.2 Education System

Education system of Kobe Institute of Computing is a system for training specialized professionals. All subjects are characterized by a systematic course that consists of "basic", "specialized", and "practical experience". The "basic" part is the learning of basic abilities as a professional and as a person in society (a person who participates in work); the "specialized" part is the learning of practical professional skills by studying professional subjects and through practice in various fields; "practical experience" is the cultivation of problem-solving abilities through cooperation with companies, accumulating experience, and making students confident. The specifics are shown in Figure 1.

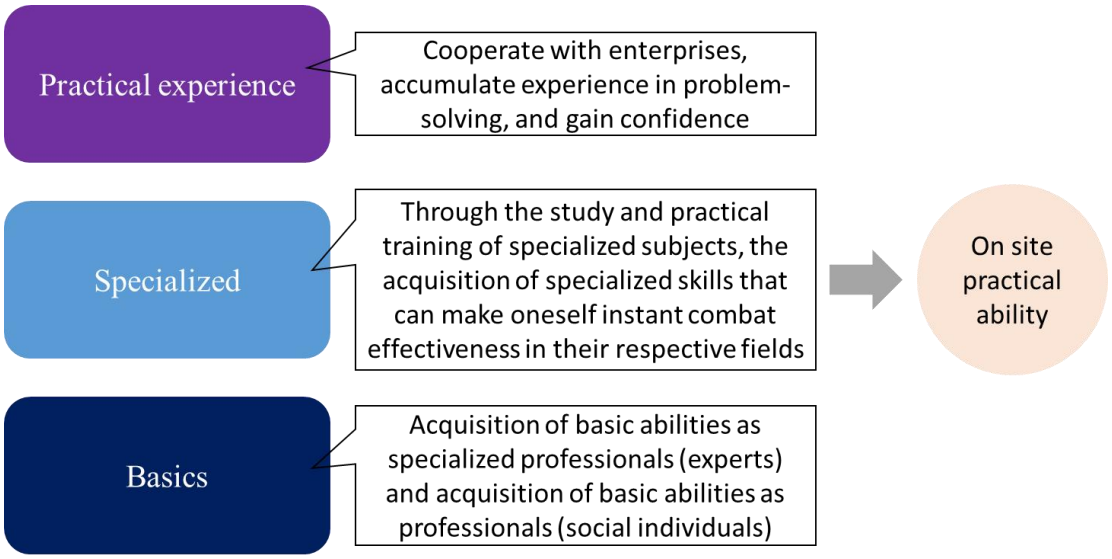

Figure 1. A three stage hierarchical education system

Source: Translated from Kobe Institute of Computing Website - Basic School Information

The school believes that a high level of problem-solving ability is a fundamental ability for specialized professionals. Specifically, as shown in Figure 2. With the changing of social economic needs and the worsening trend of fewer children, as a higher education institution specializing in vocational education, the school should have a long-term vision to flexibly respond to changes and extensively cooperate with industries. Additionally, fundamental goal of Kobe Institute of Computing is that "educational results = employment results". Not only does the school aim to improve employment rates, but it also carries out various activities and measures to strengthen the connection between students, the local community, and society.

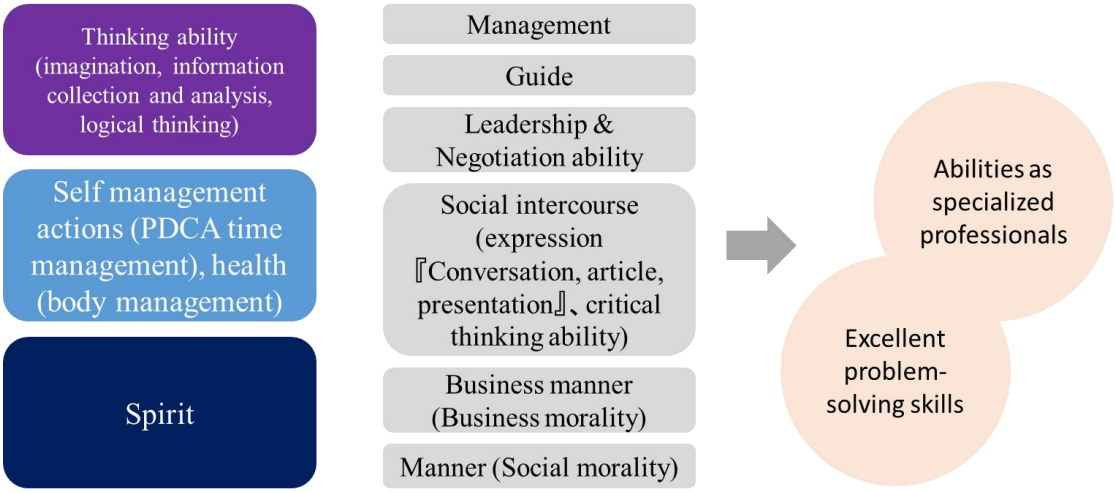

Figure 2. Basic abilities as specialized professionals

Source: Translated from Kobe Institute of Computing Website - Basic School Information

4. Insights for China

Vocational education is a necessity for national development. Currently, in the context of high-quality development, our country has a low proportion and large gap of high-skilled talent. Facing the demand of strategic emerging industries, advanced manufacturing industry, modern service industry, and modern agriculture for high-quality technology and skill-based talent, vocational education must shoulder greater responsibilities. The newly issued Vocational Education Law of the country, with its latest development concepts and system innovations, has systematically constructed a legal system for vocational education in the new era, which will play an important role in promoting the high-quality development of vocational education. The educational experience of the Kobe Institute of Computing in Japan has enlightening significance for thinking about many problems in the future development of vocational education in China.

4.1 Regarding Specialized Courses

Vocational education must keep pace with the times, adapt to market demands, and meet the needs of regional economic development, cultivating applied professional and technical personnel needed by society and enterprises.

The economic development level and development level of various regions in our country vary, and the demand for talent is also different. Therefore, higher vocational education should be based on local conditions, meet local economic development needs, scientifically set up majors based on local economic development needs and combining their own professional characteristics, and cooperate with local enterprises to challenge practical issues that co-operative enterprises provide. According to the new Vocational Education Law, local enterprises can use capital, technology, knowledge, facilities, equipment, venues, and management factors to jointly educate students and connect with industrial development. Taking Jiangsu as an example, majors can be geared towards high-end industries represented by emerging industries, high-tech industries, and docking with advanced manufacturing and modern service industries in Jiangsu. According to the development plan of Jiangsu's "14th Five-Year Plan" for scientific and technological talents, majors can also be geared towards Jiangsu's strategic emerging industries in the "14th Five-Year Plan".

Meanwhile, the courses established should value the basics, have flexibility, and offer elective courses within the students' interests, focusing on practical exercises and cultivating students' hands-on and practical theoretical skills. This curriculum design has comprehensive subject knowledge, system integration, and practicality.

4.2 Regarding Philosophy and System

The three-stage education system of the Kobe Institute of Computing has specialized education in specialized subjects and internships, which results in professionals with practical

technical skills in various fields. The so-called "practical technical skills" refers to being able to recognize the essence of things calmly when entering a new and unfamiliar environment and then quickly make correct judgments and plans. China's higher vocational education should clearly define the training objectives, cultivate highly qualified and highly practical personnel, and teach sustainable knowledge or practice that is truly beneficial and effective for graduates' future development, which can become vocational and technical personnel needed by society. Schools should shift from "quantity" to "quality" in terms of training, developing high-quality talents with high standards while respecting students' individualized development, and ultimately cultivate the spirit of craftsmanship.

4.3 Regarding External Exchanges and Internationalization

In the context of international education, both the internal dynamics of the "One belt and One Road" initiative have brought opportunities and challenges to the international development of vocational education.

The Kobe Institute of Computing values Japanese language education for foreign students and responds to the Japanese government's policy of accepting African students. China's higher vocational education should prioritize Chinese language education, making Chinese a tool for foreign students to help them continue their studies or enter relevant fields. By setting up a specialized Chinese language course combined with specialized courses, China's vocational education can explore an international development model of "Chinese language + Vocational skills".

Domestic vocational and technical colleges can take the initiative to carry out international exchanges, applying the modern apprenticeship talent training model of China's school-enterprise cooperation and industry-education integration to the training of international students and exploring new ways for international development.

Fund Project

This research was supported by Postgraduate Research & Practice Innovation Program of Jiangsu Province (KYCX22_1234:).

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