

Research on the Training Scheme of Innovative Foreign Language Talents in the Era of Artificial Intelligence: Based on Job Market Data from Guangdong

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Abstract: The rapid growth of Artificial Intelligence (AI) is fundamentally changing the demand for foreign language skills, displacing traditional professions while also creating new opportunities for individuals with diverse skill sets. Based on human capital theory and a constructivist learning approach, this empirical study analyzes 2,824 job advertisements (2022–2023) from a large recruitment platform in Guangdong, China, to investigate these changing demands and offer an innovative training program. Quantitative content analysis reveals a significant market movement away from pure linguistic competency and toward a model of compound knowledge. According to key findings, high-frequency demands now combine advanced language skills (English first and Japanese second) with technical competencies in programming (Python, Java), AI applications (machine learning, NLP), and industry-specific knowledge (e.g., mechanical engineering, international trade), as well as essential soft skills such as intercultural communication. Explicit mentions of AI-related talents confirm the technology’s penetration into the industry. A large gap exists between these diverse market needs and the output of traditional language-centric systems. In response, the study proposes a unique training structure based on the “Foreign Language + Professions + AI” curriculum. This strategy combines multidisciplinary knowledge, embedded AI literacy, and hands-on project-based learning to develop future-ready professionals capable of prospering in a technologically driven global economy.

Keywords: Artificial intelligence; Compound foreign language talents; Job market analysis; Talent training scheme; Guangdong province

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1. Research background, objectives, and significance

The emergence of artificial intelligence (AI) has initiated substantial changes across various sectors, including language services. Technologies such as machine translation, natural language processing, and automated speech

recognition have achieved significant accuracy, reducing reliance on traditional language-related tasks like translation and language instruction. At the same time, national strategies such as “Made in China 2025” and the “Belt and Road Initiative” have heightened the need for talent with international competencies, especially in economically active regions like Guangdong Province—a critical hub for global trade and cross-cultural engagement.

These developments make the re-evaluation and innovation of foreign languages a top priority. While the demand for language skills remains, today’s employers are looking for people with technical, business, engineering, or other skills as well as virtues such as cultural communication and critical thinking ^[1]. AI is automating routine language tasks, allowing human professionals to focus on creative and valuable activities that require emotional intelligence and strategic understanding.

This study aims to systematically investigate the specific demands and evolving trends within Guangdong’s job market for foreign language talents. This study examines 2,824 job advertisements published between October 2022 and June 2023. It investigates the required skills, knowledge frameworks, and remuneration levels. The analysis pays particular attention to artificial intelligence, compound foreign language talents, job market analysis, and talent training schemes. In addition, the study also shows a serious difference between the current market demand and the outputs of conventional foreign language education programs. Finally, it proposes an innovative, AI-era-appropriate training framework that includes curriculum redesign, considering curriculum redesign and teacher development strategies.

This study has both theoretical and practical significance. In theory, it combines perspectives on foreign linguistics, education and labor economics, educational technology, and labor economics, offering a new framework for educating foreign language professionals with multidisciplinary competencies. The study offers practical insights for educational institutions to update their curriculum and teaching methods. It helps better prepare students for a changing job market. Additionally, it supports policymakers and employers in strategic planning and recruitment. By linking foreign languages to economic goals and technology trends, the study supports China’s broader goals of expanding international communication capabilities and cultural influence.

2. Research questions

To achieve the above objectives, this study seeks to answer the following questions:

RQ1: What are the key characteristics of job postings for foreign language talents in Guangdong?

RQ2: What are the specific linguistic requirements and the non-linguistic competency requirements stated in these job postings?

RQ3: How do these requirements, especially the emerging ones related to AI and interdisciplinary knowledge, reflect the impact of the AI era on the language services industry?

RQ4: Based on the identified gaps between market needs and current educational output, how should an innovative training model be appropriate for foreign language talents in the AI era?

3. Literature review

3.1. The changing landscape: AI’s impact on language services

Scholars have extensively documented the disruptive influence of AI on translation and language learning. Bowker points out that machine translation works well for ordinary jobs ^[2]. However, people are now more important in

jobs that need human skills. For example, they must check the text before and after translation. They also have to handle projects that are difficult or involve different cultures. Similarly, in education, AI-powered tools can provide personalized learning experiences for students. Because of this, the role of the teacher is changing. Teachers are no longer mainly responsible for transferring knowledge. Instead, they are becoming facilitators who help students develop critical thinking and communication skills ^[3].

3.2. The evolving demand for compound talents

The concept of “compound talents” or “T-shaped professionals” is central to modern talent discourse. Neeley emphasizes that global business communication requires deep cultural intelligence (CQ) alongside linguistic skill ^[4]. Furthermore, research by the European Commission on the future of translation highlights a growing demand for specialists who combine language skills with expertise in a specific technical or business domain ^[5]. Employers require employees to have strong language abilities. They also expect workers to be knowledgeable in professional fields. These fields include office administration, international trade, accounting, and law. This situation is especially clear in the Guangdong-Hong Kong-Macao Greater Bay Area. Because this area is developing quickly, companies now highly value international talent. These talents need to understand local industry features. They must also have the ability to communicate technical information across different cultures.

3.3. Current reforms in foreign language education

In response, universities are exploring reforms. Many are introducing “Language + X” programs, where “X” represents a field like business, law, or technology ^[6]. There is also a push to integrate technology into the curriculum, teaching students to use CAT tools, MT post-editing (MTPE), and corpus linguistics ^[7]. However, these reforms are often new and not widespread. They are not put in place in a consistent way across all institutions.

3.4. Research gap

Previous studies have often relied on theoretical discussions or small-scale surveys. A significant gap exists in large-scale, empirical analysis of real-time job market data to ground these discussions in concrete evidence. Most studies are national in scope, lacking a regional focus on dynamic economic hubs like Guangdong. This study tries to address this lack. It uses a data-driven method to analyze job advertisements from a leading recruitment platform. The goal is to give a detailed picture of local employer demands. Based on this, we can make more specific suggestions for updating education programs.

4. Theoretical foundation

This study is based on two important theories. These theories provide a way to understand job market information. They also help to create an education plan that can change based on what is learned. Human Capital Theory explains what skills employers need. Constructivist Learning Theory provides the educational basis. This basis helps create training programs that meet those needs.

Human Capital Theory was first developed by economists such as Schultz and Becker ^[8-9]. This theory views knowledge, skills, and abilities as a type of capital. Individuals can invest in this capital through education and training. This investment is expected to yield results in the future. The expected benefits of this investment will lead to future returns. These returns will come in the form of higher productivity, which will bring greater economic rewards. These rewards include higher wages and better job opportunities. From an

organizational perspective, hiring skilled workers is an investment in human capital. This investment aims to improve competitiveness. This study uses this theory as a macroeconomic framework to analyze labor market signals in Guangdong. Certain wage levels reflect the market value of human resources. For instance, fluency in English, knowledge of international trade, and the ability to use CAT tools demonstrate. Through this pattern analysis, the research can determine the most valuable composite skill sets in the AI era. These findings guide educational institutions in allocating resources toward helping students develop human capital that enhances their competitiveness. This supports the economic rationale for educational investment.

However, understanding what is being taught is only half the answer; people also need a theory for how to teach it effectively. This is where Constructivist Learning Theory becomes essential. Constructivism has its origins in theories from Piaget, Vygotsky, and Dewey^[10–12]. It affirms that students should accumulate knowledge through experience and social interaction. They do not just receive information passively. Learning is seen as a social, contextual, and inquiry-driven process. This theory provides the basis for the design of new training programs. Skills such as critical thinking, problem solving, and adaptation are critical to innovation. These skills go beyond memorization or traditional teaching methods. They require new approaches that involve learners in developing skills through real-world contexts. According to constructivism, the new curriculum should center on situated learning within authentic contexts. It must include collaborative projects that reflect real professional situations. It should encourage independent research and allow students to use artificial intelligence tools to solve complex problems. This approach changes the teacher's role. Instead of transmitting knowledge, the teacher now facilitates learning.

These two theories work together. Human Capital Theory shows why the foreign language curriculum should change. It identifies what skills the market needs from an economic perspective. Constructivist Learning Theory offers a way to make this change in teaching. Together, they link market needs to educational methods. This helps ensure that the training program is useful in practice and effective in teaching.

5. Research design

This study takes a mixed-methods approach, with quantitative content analysis as the primary instrument, supplemented with qualitative theme analysis to capture more nuanced details. The quantitative analysis uncovers macro-level trends and salient features through systematic data mining and statistical examination of job postings, whereas the qualitative analysis involves coding and interpreting specific descriptions within job requirements to identify complex competencies and qualities that cannot be fully captured by numerical data alone.

The research data were gathered from job postings on mainland China's biggest recruitment platforms, such as Zhaopin and 51job, between October 2022 and June 2023. There were 2,824 job ads in Guangdong Province that explicitly needed foreign language skills. These data span a wide range of industries, employment types, and business sizes, ensuring significant representativeness and timeliness.

During the data processing step, the raw data were subjected to an initial purification technique that removed duplicate postings, irrelevant entries (e.g., occupations that did not require language abilities), and samples with key missing information in order to ensure validity and analytical correctness. A systematic coding framework was then created utilizing Excel and SPSS tools to annotate and extract each job ad across many dimensions. Coding factors included basic job information (e.g., job title, firm name, industry, location, number of openings, and salary range), linguistic requirements (e.g., target languages, proficiency levels, and certification needs),

and non-linguistic competencies. The latter were further classified into technical skills (e.g., computer-assisted translation tools, office software, machine translation post-editing, Python programming), industry knowledge (e.g., international trade, e-commerce, logistics, law), soft skills (e.g., communication, teamwork, problem-solving, intercultural competence), and explicit AI-related skill demands (e.g., direct mentions of keywords such as “artificial intelligence”).

This systematic data processing and encoding method offered a solid platform for moving the study from descriptive observations to in-depth data-driven inferences.

6. Findings and discussions

This study conducts a quantitative analysis of 2,824 job advertisements published between October 2022 and June 2023 to systematically examine the characteristics and trends of the foreign language talent recruitment market in Guangdong Province, using in-depth data mining and high-frequency word analysis. According to the findings, the market is transitioning from a focus solely on linguistic abilities to a composite model of “language proficiency + professional expertise + technical competencies.” The main force behind this change is the development of artificial intelligence (AI) technology, which offers strong support for four main research questions.

6.1. For RQ1 (Key characteristics)

According to data research, the Guangdong foreign language talent recruiting market demonstrates a unique blend of high concentration and diversification with respect to RQ1. Technical positions make up 45.8% of the sector distribution (general positions make up 54.2%, totaling 1,531 posts), with the highest demand being seen in mechanical engineering (631 posts) and programming technology (391 posts), while healthcare roles are relatively rare (111 posts). This distribution is consistent with Guangdong’s industrial structure as a manufacturing and digital economy hub. Full-time employment makes up the majority of employment kinds (96.56%, 2,525 posts), while internships and part-time jobs make up only 3.44% (90 posts). This indicates that companies strongly desire steady, specialized foreign language specialists with diverse competencies. With an average monthly income of ¥9,049 (median ¥7,500), the mechanical engineering sector leads the wage distribution, with programming technology coming in second at ¥8,154. On the other hand, the healthcare industry pays ¥5,721 a month, which is somewhat less competitive. General positions have the largest compensation range (¥4,000–18,000), which suggests that market valuations for skills in various disciplines varied significantly.

6.2. For RQ2 (Competency requirements)

Results for RQ2 show that work needs have significantly moved away from traditional, exclusively linguistic skills and toward a composite competency model that includes “linguistic foundation + professional depth + technical literacy + soft skills.” English is 4.3 times more common than Japanese (313 occurrences, 13.0%), with 1,359 occurrences (56.3%), indicating complete dominance in linguistic proficiency. Spanish (163 occurrences), Russian (154), Chinese (145), French (144), Korean (118), and German (116) are in the middle tier, with Portuguese (69) and Arabic (59) in lower demand. Arabic jobs require the most composite language skills (around 68%). Portuguese jobs require bilingual skills in roughly 55% of situations, and English jobs require the most monolingual skills (82%). Language proficiency is certified through dual certification systems: local (e.g., TEM-4/TEM-8), international (e.g., IELTS/TOEFL), and Japanese Language Proficiency Test levels N1/N2.

Even more crucially, non-linguistic skills become determining factors:

According to a technical needs analysis, the demand for general technologies (313) is 3.6 times more than that for AI technologies (87), with the demand for C++ (92) alone surpassing the demand for all AI technologies. In particular, deep learning (28) > machine learning (26) > natural language processing (17) are the top AI technologies, while C++ (92) > Python (78) > Java (75) are the top three general technologies. There are significant differences in concentration levels: the demand for AI technologies is fairly balanced (deep learning makes up 32.2% of AI categories), while the demand for general technologies shows a long-tail distribution (C++ makes up 29.4%). The most common pairing of skills is C++ and Java in general technologies (48 occurrences), but deep learning and computer vision (CV) are most frequently coupled in AI technologies (12 occurrences). Database abilities (SQL, 68) are more in demand in commercial applications than any other AI technologies. Both the general (62%) and artificial intelligence (100%) domains highly value Python. The demand for computer vision (16) has surpassed that for natural language processing (17), while traditional programming languages (C++/Java) continue to account for 38.3% of technical requirements.

The second is industry-specific knowledge, which emphasizes experience with “technology” (8,911 occurrences), “products”, and “clients” (6,250 occurrences). This includes knowledge of products, technologies, and technologies of particular industries like e-commerce, international trade, and mechanical engineering.

In terms of soft skills, communication is exceptional (5,375 instances), highlighting its vital role in cross-cultural teamwork.

Fourth, degree requirements favor bachelor’s degrees (10,057 occurrences); master’s degrees (5,412 occurrences) are required for some occupations.

6.3. For RQ3 ((Impact of the AI era)

Job advertisements immediately attest to the fact that AI technologies are significantly altering the language services industry’s value chain and talent requirements with regard to RQ3. AI is now a part of some employment requirements rather than just an abstract idea. The industry is moving away from “human processing” and toward “human-machine collaboration” and even “algorithm-driven” operations, as seen by explicit needs for key AI technologies like computer vision (32), natural language processing (34), and PyTorch (28), as well as TensorFlow (24). Despite the rapid advancement of AI technologies, the industry is currently in a transitional phase where traditional and AI technologies coexist, as evidenced by the fact that the overall demand for general technologies is still 3.6 times that of AI technologies. Machine translation post-editing (MTPE) models are replacing traditional, repetitive language tasks (e.g., basic translation), refocusing value creation on advanced capabilities such as mastering AI tools, managing complex contexts, and engaging in creative expression and strategic decision-making. In the AI era, foreign language professionals must therefore develop into “new-type specialists” who understand technical logic, make use of technological tools, and work well with technology.

6.4. For RQ4 (Training program innovation)

With respect to RQ4, this study unequivocally shows a substantial discrepancy between the results of contemporary foreign language instruction and the multifaceted needs of the market. Traditional curriculum focusing on language and literature is insufficient for developing the composite talent with “language + technology + industry” knowledge that the market urgently requires. To bridge this gap, a novel training program for the AI era must combine the following fundamental elements.

6.4.1. Curriculum restructuring

Implement a “Foreign Language + X + AI” curriculum reform, where “X” refers to a specific professional domain (e.g., smart manufacturing, international commerce, digital media) and “AI” refers to overall technical literacy. Curriculum should include interdisciplinary modules such as “Computational Linguistics”, “Localization Project Management”, and “Cross-cultural Data Analysis.” Differentiated technical learning paths should be established for distinct job trajectories. AI developers should focus on Python, deep learning, and domain applications (CV/NLP), while systems engineers should prioritize C++, Java, and database systems.

6.4.2. Teaching model transformation

Switch from knowledge transmission to constructivist-driven experiential learning. Encourage project-based learning (PBL), which involves students in real-world corporate scenarios and employs AI tools to tackle multilingual and multicultural problems, encouraging critical thinking, cooperation, and creativity abilities.

6.4.3. Evaluation system expansion

In order to match their competency credentials with market signals, encourage students to earn “1+X” certificates, which stand for “language proficiency certificates + industry/technical qualifications” (CATTI + Python programming certificate or international trade practitioner certificate, for example).

In order to develop faculty and ecosystem, it is recommended to enhance industry-academia cooperation, bring in industry mentors, co-create courses and real-world platforms, make sure that the learning materials are current and relevant, and create an ecosystem for iterative talent development.

6.4.4. Recruitment strategy adjustment

Corporate recruiting tactics should be adjusted in response to technology demand differences. AI positions should clearly distinguish between theoretical research and engineering implementation requirements, whereas fundamental development roles should prioritize coordinated assessment of C++/Java abilities. Due to the 41% demand for English+German in mechanical engineering, educational institutions should include German elective courses in mechanical engineering programs; job seekers should learn English+Japanese combinations, which cover 85% of technical positions; and healthcare organizations should give priority to French proficiency (27% demand in this sector).

The development of foreign language human resources in the age of artificial intelligence necessitates a fundamental shift from theory to practice. This shift aims to train creative international professionals with access to technology, entrepreneurial skills, and effective communication, meeting the strategic needs of the Guangdong-Hong Kong-Macao Greater Bay Area for highly linguistically skilled labor as well as the global economy for top-tier language service talent.

7. Conclusion

This research deciphers a fundamental paradigm shift in competency requirements within Guangdong’s foreign language job market. The core of this transformation lies in the shift from a narrow emphasis on purely linguistic competencies toward an integrated model that values the synergy of language proficiency, domain-specific knowledge, and technical literacy. The authors argue that this balance is largely due to advances in artificial intelligence, which pose major challenges for higher education and industry.

An analysis of employment characteristics (RQ1) shows that the market is closely related to the regional economic strategies. The obvious concentration of opportunities in the fields of mechanical engineering and programming, coupled with a decline in demand from sectors such as healthcare, shows that regional industrial policy has a major impact on labor dynamics. In addition, the overwhelming preference for full-time work and the observed salary scale also reflect the market value for the stable and multidimensional skills of technical and language professionals.

In terms of competency frameworks (RQ2), language abilities still play an important role, but now they act as a foundation for building more important competencies. The dominance of English persists, yet the elevated requirements for bilingual capabilities in languages such as Arabic and Portuguese underscore the growing importance of communicative versatility. In addition to language, technical capabilities, including programming, artificial intelligence applications, and data management, have become important decisive factors for competitiveness. Similarly, industry knowledge and soft skills such as communication and cross-cultural coordination carry considerable weight in employer requests.

The disruptive impact of artificial intelligence (RQ3) on language-related professions is particularly noteworthy. The findings suggest that the current situation is in a transitional phase, with the potential for traditional technology to continue to link to emerging artificial intelligence tools. This signals an imperative for future language professionals not only to adeptly utilize AI technologies but also to solve problems in a creative way, and their expertise in other areas remains an important factor in the field of senior decision-making.

In response to these changes (RQ4), it is argued that current training paradigms for foreign language talents require comprehensive reform. The courses should be reorganized within the framework of “Foreign Language + X + AI”, emphasizing interdisciplinary integration and technology sensitivity. Instructional methodologies require a fundamental shift from information dissemination to project-based, context-rich experiential models that cultivate innovative thinking and teamwork capabilities. To guarantee ongoing congruence between educational outputs and changing market demands, institutional structures like industry-academia partnerships and the “1+X” accreditation system should also be reinforced.

To sum up, schools, businesses, and legislators must work together to create a future-focused system for developing transdisciplinary language skills in order to meet the difficulties of the AI era. A program like this will help the Guangdong-Hong Kong-Macao Greater Bay Area grow strategically and improve China’s ability to compete successfully in the global digital economy.

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Authors' contributions

Ling Liang conceived the idea of the study, analyzed the data, and wrote the paper. Jiayi Zhong co-authored the literature review and theoretical foundation. Hualing Huang revised the research design and conclusion. Siyang Zhu and Xiang Zhao collected the data set.

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