

Review Article

Present Situation and Enlightenment of Artificial Intelligence Lifelong Education System in Singapore

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ABSTRACT

The development of artificial intelligence technology depends on the cultivation of artificial intelligence talents, so countries all over the world attach great importance to the cultivation of artificial intelligence talents. As a world power in science, technology and education, Singapore has taken the lead in the field of artificial intelligence education. Based on this, the article focuses on Artificial Intelligence Education in Singapore. Firstly, it introduces the lifelong education system of artificial intelligence in Singapore in detail, and then analyzes the characteristics of this system, including the curriculum system of teaching students according to their aptitude, the teaching method of doing things according to their needs, the teacher selection mechanism according to their needs, etc. Finally, based on the current situation of AI education in China, this paper analyzes the Enlightenment of AI education in Singapore to China from the perspectives of teaching resources, curriculum system and teacher team construction, so as to promote the development of AI education in China.

Keywords: Artificial Intelligence Education; Singapore; Lifelong Education; Double Qualification System

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1. Introduction

Singapore attaches great importance to artificial intelligence, and its national development goal is to become a “smart nation” and develop the artificial intelligence industry with the effort of the whole nation. In 2017, Singapore issued the “Ai Singapore” (AISG) plan. In addition to providing economic and policy support to AI, many reforms have been made in education and the way of talent training, aiming to consolidate the country’s leading edge in the field of AI and establish a self-contained system for human intelligence talent training^[1]. In 2019, Singapore issued the *National AI Strategy*, which has increased the research input and financial support for AI education, and rethought the development mode of AI education from its root, so as to improve innovation and creative productivity^[2]. Through reform and innovation, Singapore has established a lifelong education system of artificial intelligence for all ages, with a hope to continuously transporting talents for the country’s future development.

In order to have the right of speech in the future AI field, Singapore has actively formulated and released the AISG plan, which points out the direction for the future development of AI education in Singapore and provides a reference for AI education reform in other countries in the world. Luo Jialiang, Singapore’s ambassador to China, believes that the key to the success of Singapore’s education is to provide students with balanced holistic education, fully develop people’s potential and pay attention to cultivating skills of the 21st century^[3]. With the finan

cial policy support of the National Research Foundation Scholarship (NRF Fellowship), AISG program has attracted global AI talents and accelerated innovation in the field of AI; by building the “AI Makerspace”, the combination of online and offline AI education is realized; at the same time, according to the characteristics of all ages, a complete set of lifelong artificial intelligence education system is launched. This system relies on conventional courses of schools and professional training, and pays more attention to the interest cultivation of all people, knowledge popularization and lifelong education. It can be said that AISG program provides systematic teaching resources and practices for Singaporeans to acquire the knowledge and ability they should have in the era of artificial intelligence, and it helps to realize the efficient sharing of educational resources and achieve the national development goal of “smart nation”.

2. Singapore Lifelong Education System of Artificial Intelligence

According to the three steps of learning, practice and sharing, Singapore AISG plans to integrate various education resources and design online courses such as AI4K, AI4S, AI4E and AI4P for primary school students, middle school students, practitioners and all citizens of different ages and professional backgrounds, so as to guide citizens to recognize, understand and be familiar with the relevant knowledge of artificial intelligence and make in-depth thinking and innovation. At the same time, Singapore has also set up a vocational training program AIAP for AI engineers, i.e. through professional training for science and engineering students, we can continuously provide high-level AI engineers for the country. The specific training mode of AISG program is shown in **Figure 1**. By offering these free courses, Singapore has built an artificial intelligence lifelong education system to ensure that citizens with different educational backgrounds can access AI education in the AI era on the one hand, and provide support for the development of AI education in Singapore on the other hand.

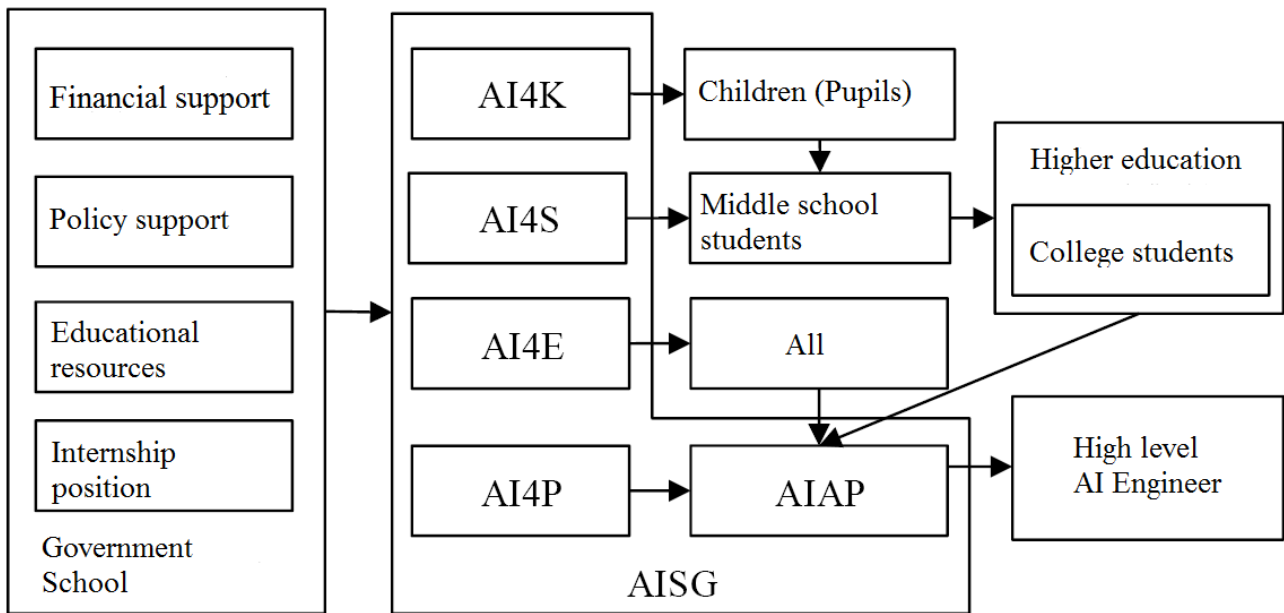


Figure 1. Training mode of Singapore AISG program.

2.1 AI4K: Artificial intelligence education for children aged 10–12

AI4K (AI for children) course mainly aims at the cognitive level and learning characteristics of children aged 10–12 (i.e. primary school students in grades 4–6), and carries out AI enlightenment edu-

cation by guiding students to study online. AI4K course is designed by the Singapore government in cooperation with Mathematics and Science High School of National University of Singapore to introduce the concepts related to AI technology and how to use Scratch, Azure and other programming tools to code basic AI applications. The course fo-

cuses on divergent thinking and practices. The purpose is to cultivate the interest of primary school students aged 10–12 in learning artificial intelligence, and popularize the basic principles and related concepts of programming and artificial intelligence. Through the combination of online and offline classroom, the course adopts life-oriented and vivid description to replace the previous written and conceptual definitions, so that students can have in-depth understanding from multiple dimensions rather than simple memorizing. The course attaches importance to interest orientation and life orientation. Through agile methodology^[4], it creates a cognitive method that is universal, can be maintained for a long time and expanded in depth and updated in time. It adopts the cognitive mode of interest guidance, problem driving and life relevance to build the knowledge framework and cognitive system of artificial intelligence for students, and the specific knowledge is explored, filled and enriched by students themselves. It has laid a solid foundation for their follow-up in-depth learning of artificial intelligence.

AI4K course is vivid. It takes full account of the age characteristics and learning habits of the teaching objects, and closely combines the course content with common sense of life, so as to deepen students' understanding of concepts and common sense of data science, machine learning and programming etc., and contribute to subsequent in-depth learning. Different from the concept teaching of conventional courses, AI4K course establishes the conceptual framework of artificial intelligence technology for students by connecting small examples in life with machine learning, programming and artificial intelligence. For example, when teaching the concepts related to machine learning, the course changes the conventional concept teaching method, taking the introduction of machines in life as the starting point, expanding the students' definition of machines, and then extending to the principles of computers and computing, so as to make students understand what machine learning is more deeply and intuitively.

AI4K course is also highly targeted. Most children aged 10–12 receive artificial intelligence education for the first time, and their mastery of AI

principles will determine their development level in the future. Taking full account of the coherence of lifelong education, the AI4K course designed in Singapore not only cultivates students' interest in artificial intelligence, but also constructs students' basic cognitive framework of artificial intelligence, which lays a foundation for students' further study of artificial intelligence in the future. At the same time, considering that children in this age group are more lively, AI4K course adopts the learning method of hour simplified teaching and the combination of linear and nonlinear. About 15 pages of PPT are taught in each class. Students can control the learning progress by themselves. Each page of PPT can be studied repeatedly, and they can study the next unit after thoroughly understanding the knowledge of this unit. Therefore, students do not have to follow the linear learning method of conventional courses. They can freely control the learning progress, and connect each small knowledge point into a complete linear knowledge vein through nonlinear learning method. Teachers will be trained regularly by Singapore government to ensure the quality of the faculty, and teachers who accomplished the training can acquire the qualification for the teaching of AI4K courses. After training, teachers can fully exploit and make use of the school's teaching resources and campus environment to teach artificial intelligence to students efficiently at any time. This training program will also involve parents and volunteers with teaching qualification to make family education work better, and help schools expand the participation scale of AI4K and strengthen the learning effect, so as to achieve the goal of enabling all primary school students in Singapore to learn artificial intelligence.

2.2 AI4S: Curriculum developed for middle school students aged 13–16

AI4S (AI for students) is a course for secondary school students in Singapore. It aims to strengthen the artificial intelligence accomplishment of the next generation of citizens. AI4S implements the plans of basic programming and data science teaching, so as to build students' artificial intelligence knowledge foundation and reserve the next generation of artifi-

cial intelligence talents for Singapore. With the help of AI Makerspace and Datacamp (an online education platform of data analysis established in the United States in 2014), middle school teachers can use AI4S course as a supplementary course to their conventional AI teaching to cultivate students' AI literacy and help students get familiar with AI and

data science. AI4S course is an online video course. Through independent design and integration of existing online course resources, it completes the teaching of Python language learning, programming tool use, model building, data analysis and practice with relevant knowledge for middle school students. The specific course contents are shown in **Table 1**.

Table 1. AI4S course content

AI4S 1.0: Management Guide		
Management Guide		
AI4S 2.0: AI 101 Track		
Introduction to Python	Introduction to data science SQL	Python data science toolbox
Intermediate Python in Data Science	Introduction to data science Git	Supervised learning using scikit learn
Script of introduction to data science		
AI4S 3.0: Challenge yourself (build tools)		
Build a personal machine learning environment	Practice Git	Cognitive tools
Bash terminal	How to install tools	Ides and Jupiter notebook
AI4S 4.0: Challenge yourself (return)		
Regression	Understand deviation/difference tradeoffs	Exploratory data analysis
Establish KNN regression function	Establish linear regression model	
AI4S 5.0: Challenge yourself (classification)		
Data classification	Processing data imbalance	Exploratory data analysis
Decision tree and integration method	Classification using KNN	Logistic regression and building a collection of individuals
AI4S 6.0: Challenge yourself (unsupervised learning)		
Unsupervised learning	Analysis of shopping basket based on association rules	Exploratory data analysis
Hierarchical clustering	Customer segmentation	
AI4S 7.0: Challenge yourself (deep learning)		
Deep learning		

AI4S course emphasizes the sense of acquirement learning and students' interest in learning. AI4S course is an advanced course of AI4K course. In addition to the higher degree of difficulty and more systematic, professional and comprehensive course content, the course also reduces visual contents such as PPT, animation and games, and adds knowledge contents such as programming, code and computer language. Students are encouraged to complete interesting cases through programming after class, emphasizing the sense of acquirement in learning. For example, for the learning of “decision tree and integration method” in Section 5 of Chapter 5, after summarizing the learning content of this lesson, AI4S course introduces an important algorithm of artificial intelligence—decision tree by

demonstrating how computers make decisions. By displaying the corresponding code, the implementation process of the program is clearly presented. With the foundation of early course learning, students can intuitively understand the implementation principle of this algorithm, and then complete the learning of this case through programming.

AI4S course focuses on the practicality of learning and builds a programming practice course—“Code for Fun”. “Code for Fun” course was originally an elective enrichment class, which was provided by 116 primary schools and 66 middle schools. In 2014, “Code for Fun” was transformed from the original elective course to a compulsory course, and all students must complete a certain length of course. The statistical results at that time

showed that more than 80% students had a deeper interest in coding after participating in the “Code for Fun” course^[5]. This course provides excellent coding programs, online robotics and technology courses. For example, through after-school activities and summer camps, students are taught to code programs in Python, Scratch, Swift and other languages, and to use tools such as Arduino, BeeBots, Lego WeDo, Sphero and Parrot Drones, so that students can get in touch with program design in advance and master the cutting-edge development status of artificial intelligence. Computer programming, computer science and STEM programs are important concepts in today’s society of information. While enjoying the fun of creating games, developing mobile applications, designing web pages and making videos and animations, children will also have a certain understanding of these important concepts.

2.3 AI4E: Popular science courses for all groups

AI4E (AI for everyone) is a course to introduce modern AI technology and applications to everyone, so as to deepen people’s understanding of artificial intelligence, promote people to accept artificial intelligence products and services, and then promote the development of artificial intelligence. AI4E course mainly adopts the form of online video course, online live broadcast and offline discussion. At the same time, it also integrates the high-quality online open courses of Internet companies such as Microsoft, Google and apple. The course considers the knowledge content of each chapter as a whole, formulates detailed recommended learning time, and encourages learners to make learning plans independently. Through the study of AI4E course, learners will understand how to find opportunities in work and daily life, recognize the application of artificial intelligence, and use online tools to build a simple AI model.

A major advantage of AI4E course is to anchor the user group and accurately locate the target people. The main audience of the course are learners from countries of East Asia, South Asia and Southeast Asian. Therefore, English, Malay, Chinese, Thai and

other languages are used for teaching. A large number of living examples from these regions are used in the course, which greatly broadens the scope of application and influence of the course. At the same time, the course takes full account of the different educational levels of learners, adopts a progressive in-depth teaching method, and widely introduces cases in real life to keep learners from feeling boring in the learning process. There are eight chapters in the course. The first two chapters vividly explain what artificial intelligence is and why it is the era of artificial intelligence by sharing cases in life with the help of a large number of tables, pictures and videos, so as to avoid learners without foundation giving up because of high learning difficulty.

In addition, AI4E course also gathers a variety of educational resources, and learners can expand their learning by using the required resources according to their own learning situation. The course closely adheres to the educational goal of “improving learners’ understanding of artificial intelligence”. In the face of learners with different knowledge levels and learning abilities, AI4E recorded online courses integrate many excellent online learning resources, and also lists many recommended bibliographies to encourage learners with spare capacity to learn by themselves, thus it can avoid problems that some learners can’t learn and some learners think the explanation is not deep enough. For example, in Chapter 4, the course explains the ethical problems of AI, and these explanations only describe the current situation of AI ethics. More introduction to this problem is mainly through the recommendation of several works of British scholar M. A. Boden, so as to encourage learners to carry out inquiry learning independently.

2.4 AIAP: Education plan aiming at training AI engineers

AI for Apprenticeship Program (AIAP) aims to train AI talents with solid professional knowledge and strong practical ability for Singapore, guide students who have mastered relevant theoretical knowledge to practice and solve practical problems, and help them find job opportunities in the AI in-

dustry in the process. AIAP is completely free and conducted in batches, and the training cycle of each batch is about 10 months. Many science and engineering graduates become professional AI engineers or hold other positions in the AI industry after training.

AIAP closely focuses on the goal of training AI talents for Singapore and is extremely strict in the selection and training of learners. AIAP applicants are limited to science and engineering graduates with Singapore nationality. At the same time, applicants should have solid basic skills and knowledge in the fields of artificial intelligence and

machine learning. AIAP is a full-time structured training, including an introductory assessment, two months of theoretical study, seven months of on-the-job practice and a completion assessment, as shown in **Figure 2**. In addition to hiring university professors to be training lecturers, many experts in the field of AI are hired for the on-site guidance or as the person in charge of practical projects. Through training, learners will not only receive cutting-edge theoretical education, but also participate in many AI projects to carry out practices with high skill level, and finally grow into AI engineers who can solve problems independently.

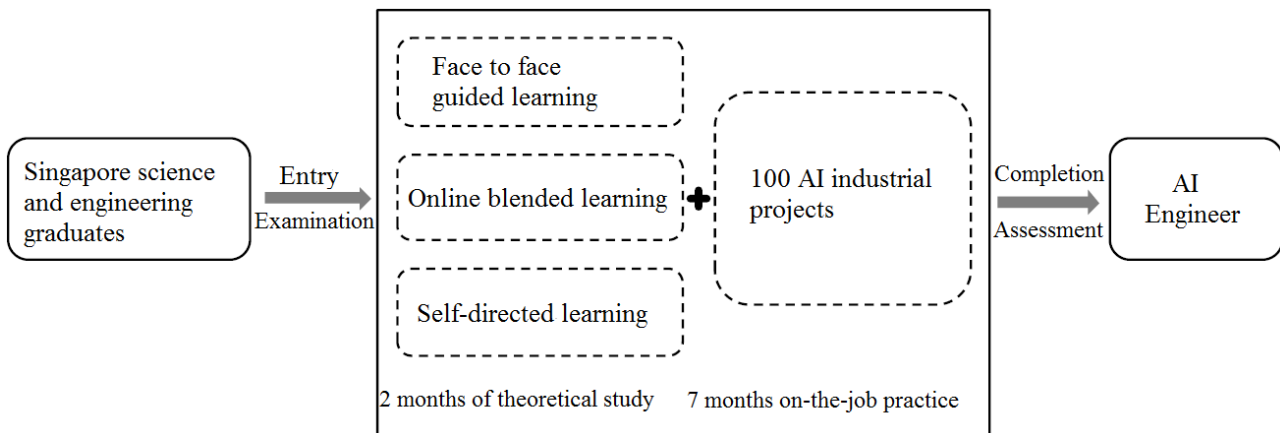


Figure 2. Schematic diagram of AIAP plan.

AIAP course combines theoretical learning with practical operation to ensure that learners not only master cutting-edge technology after graduation, but also have the ability to solve practical problems independently. Among them, the two-month theoretical study takes the forms of face-to-face guided learning, online mixed learning and self inquiry learning, so that learners can get close contact with the cutting-edge technology and development status of machine learning, understand the career development path and technical development level of AI engineers, and improve their ability to solve problems and their confidence in dealing with unknown problems. AIAP encourages learners to choose theoretical learning courses that suit themselves. After course selection, learners need to carry out learning autonomously, complete personal learning tasks every week, and have extensive discussions with tutors and experts. The course set up 100 AI industrial projects pointing to practical problems in commerce or society, and the learners

can implement their 7 on-the-job practice in one or more projects in the next 7 months. Under the guidance of skilled AI engineer, the on-the-job learners solve problems with other learners and accomplish their entry examination. In this way, learners can not only improve their skills in AI and machine learning, but also improve their skills in software engineering. Two months of theoretical study and seven months of on-the-job practice have enabled learners to rely on and apply what they have learned, which achieved the goal of “Growing Our Own Timber” set by AIAP, and continuously sent high-quality AI engineers to Singapore.

In order to ensure the effective promotion of AIAP, AISG also designed a recommended introductory course for applicants—ai4p (AI for Professional). AI4P course module and its learning schedule are shown in **Table 2**. It shows that through knowledge framework design, excellent course sharing and knowledge media construction, the course guides learners to grow into professionals in

the field of artificial intelligence and machine learning through autonomous learning for about one year, so as to help them apply for AIAP smoothly.

AI4P course attaches importance to the recommendation of knowledge content and mutual sharing among learners, emphasizes the autonomy and initiative of learning, and completes the teaching objectives of the course by integrating and further supplementing online learning resources. For example, introducing Python language and its functions with the help of 44 videos from Microsoft; learners are recommended to create their own accounts to facilitate the use of the code sharing platform—Jupyter notebook; Use online courses on

W3Schools, Apple, Intel and other platforms to introduce SQL, Azure and Git to learners; at the same time, the course recommends a series of classic works and matched online courses by Steven S. Skiena and other experts to guide learners to learn data science deeply. The course also introduces the AI governance framework in Singapore to explain AI ethics. At the end of the course, according to the needs of AIAP assessment, many works related to machine learning, AI ethics and other fields are recommended to help learners build a solid foundation of AI knowledge. After professional training of AIAP, learners can soon grow into professional AI talents.

Table 2. AI4P course module and its learning schedule

Month	1	2	3	4	5	6	7	8	9	10	11	12
Course module												
Python and SQL												
Software engineering												
Data science design manual course												
Introduction to machine learning												
Deep learning: Intel AI Institute												
Azure machine learning service												
Data engineering												
AI ethics and Governance												
Do an AI project												

3. Characteristics of Artificial Intelligence Lifelong Education System in Singapore

3.1 Teaching students in accordance with their aptitude and a curriculum system covering all age groups

With the rapid development of artificial intelligence technology, cultivating talents in the era of artificial intelligence is a common problem faced by all countries. Singapore’s AI education has refined and classified the learning ability and learning needs of different groups, and built a lifelong education system covering all ages, all educational backgrounds and all cognitive levels, so that anyone who wants to get in touch with AI can receive AI education with complete structure and coherent system.

Artificial intelligence education in Singapore is carried out by relying on the educational resources of schools and AISG program. Clear educational objectives are formulated for different groups. People of different occupations can choose appropriate online or offline courses according to their educational background and learning purpose, so as to ensure that all citizens can keep pace with the times in the era of artificial intelligence.

As for the student group, Singapore adopts the artificial intelligence education and training mode of “main compulsory courses + elective gain courses”: set up artificial intelligence courses from primary schools to build students’ artificial intelligence knowledge framework and cognitive foundation; at the stage of middle school, set the minimum learning hours and build a programming practice platform to guide students to practice on the basis of cultivating

students' professional cognition; at the stage of university, artificial intelligence majors and research directions are set up to provide students with in-depth and cutting-edge professional education. At the same time, the government funds the implementation of AIAP plan to train AI engineers for the country through purposeful enrollment, so as to form a professional improvement system.

3.2 Diversified Teaching: Methods Based on the Combination of Online and Offline

Singapore's AI education gives full play to its advantages of educational resource and the advantages of building a complete network environment, and comprehensively promotes the combination of online and offline. At the same time, it gives full play to the role of high-quality teachers through online classes, online seminars and other forms, and use the high-quality online learning resources provided by Apple, Google, Cisco and other Internet companies to integrate online education resources into daily artificial intelligence education, so as to provide students and citizens with rich learning resources and convenient learning paths.

On the one hand, Singapore explores online learning resources and selects learning resources such as Mu class and micro class suitable for students' learning as the supplement and expansion of school education. Singapore widely refers to and boldly introduces the online shared educational resources of many Internet companies into its daily courses, pays attention to guiding students to learn and use online tools or platforms, encourages students to use general development tools or shared development platforms such as Azure and Git, and draws excellent development experience from the Internet. On the other hand, Singapore integrates high-quality offline education resources and attracts more students to learn through online classes, online seminars and other forms to form large-scale education. With the help of AIAP, Singapore has gathered many high-quality primary and secondary school teachers, university teachers and AI engineers for online teaching or recording, forming a large-scale and systematic education system so as to produce

professional AI engineers.

3.3 Depending on Needs: The Teacher Selection Mechanism of "Double Qualification System"

A highlight of artificial intelligence education in Singapore is its teacher training, selection and employment mechanism. Singapore takes full account of the fact that artificial intelligence is in the stage of rapid development, and cutting-edge technologies and theoretical principles are changing fast, which is different from the stability of conventional knowledge content. Therefore, Singapore boldly carries out the reform of teacher selection and employment mechanism, and actively explores the teacher employment mechanism of "double teacher system", so as to select teachers who can meet the curriculum requirements and conduct teaching effectiveness assessment on time.

Specifically, in the basic education of AI in primary and secondary schools, Singapore uses the method of "unified training + regular assessment" to ensure that teachers have AI professional quality, and implements a dual assessment mechanism for teachers' teaching ability and subject quality. If AI4K offline teachers complete the teacher training course and pass the examination, they will be endowed with the teaching qualification of 2 years. They must pass the examination again when the teaching period ends. AI4S course is a national compulsory course. Singapore will hold course discussion every year to determine the key points of artificial intelligence education and conduct teacher training. Through regular training, AI teachers maintain advanced cognitive level and teaching closely follow the development of AI is ensured. In higher education and vocational education, AIAP adopts the "double teacher system" of theoretical education and practical education. In the stage of theoretical education, more university teachers are employed as lecturers to ensure the accuracy and comprehensiveness of theoretical learning. While in the stage of practical education, Singapore has hired many professional engineers among the front-line engineers in the industry to participate in training, and funded the establishment of artificial intelli-

gence projects, allowing these engineers to act as the project leader. After theoretical study, learners participate in engineering projects to solve practical problems. Through practicing with what has been learned, it is ensured that the advanced artificial intelligence technology can be mastered by the trained learners.

4. Enlightenment of Artificial Intelligence Education in Singapore to China

4.1 Integrate teaching resources and implement artificial intelligence education for all staff

Only by effectively connecting basic education with higher education and vocational education of artificial intelligence and building a multi-level and ladderlike talent system, can we consolidate the talent foundation for the development of China's artificial intelligence industry^[4]. Since artificial intelligence education was written into the "13th five year plan" in 2016, China has caught the "free ride" of artificial intelligence development and trained a large number of professionals. By 2019, the scale of Vocational Education in China will become the largest in the world, with the structure of artificial intelligence education constantly optimized, and the quality of artificial intelligence talents continuously improved. However, compared with the artificial intelligence lifelong education system in Singapore, the artificial intelligence education system constructed in China lacks joint force and a continuous education main line, which is prominently reflected in the lack of effective interaction and connection between artificial intelligence enlightenment education and subsequent school education. In addition, artificial intelligence education in Singapore takes "smart nation" as the national development goal, carries out progressive universal education according to different groups such as primary school students, middle school students and practitioners, and carries out in-depth research and practice in the stage of higher education. While China's AI curriculum resources are mainly concentrated in higher education, AI curriculum resources for special edu-

cation, ethnic education and continuing education are relatively scarce. The reason may be that the development of artificial intelligence education resources is limited. More importantly, there is a lack of unified standards to effectively integrate social education resources into the artificial intelligence education system of schools and the power to unify various educational forces. The lack of this main line of education will make teachers unable to intuitively gauge students' learning level of artificial intelligence, so students can only learn from scratch after entering school, resulting in a waste of educational resources. Therefore, in the future, China's AI education should be based on the "National Intelligence Education Project" in the "New Generation AI Development Plan"^[6], set development goals with reference to Singapore's "smart nation", formulate unified education standards suitable for China's national conditions, strengthen the linkage between education at all levels, and form a joint force of AI education.

4.2 Narrow the digital gap and build an artificial intelligence curriculum system with multiple teaching methods

Curriculum resources are the main carrier of artificial intelligence education^[7]. Therefore, it is necessary to build a number of online education courses that meet the national strategic needs and the cognitive rules of different groups, so as to improve people's information literacy and narrow the digital gap in the era of artificial intelligence. In the process of carrying out AI education, China ignores the popularization of the basic knowledge of AI for all citizens to a certain extent, so the digital gap has not been effectively eliminated, and people's understanding of AI lacks basic theoretical support. China has a large population, and their educational background is more complex than that of Singapore. At the same time, it is restricted by teachers, funds, hardware and other conditions. Therefore, how to improve people's understanding of artificial intelligence and effectively narrow the digital gap has become a problem demanding prompt solution for Chinese educators. With the help of AI4E

courses, Singapore carries out AI universal education for all citizens through the combination of online courses and offline seminars. At the same time, Singapore has recorded online courses in Chinese, Malay and Thai to popularize AI education in neighboring countries, and to publicize its AI standards to other countries and enhance Singapore's voice in the AI era in the future. China has become an Internet power. We can learn from Singapore's experience in AI popularization education to explore the way of online and offline mixed teaching, improve people's perception and application of AI, and promote the development of AI in China.

4.3 Explore the “double qualification system” and strengthen the construction of artificial intelligence faculty

At present, no country has set up AI teacher training major, and there are few interdisciplinary talents with both AI and education. The uneven level of teachers in AI courses is a common problem faced by all countries^[8]. Taking China as an example, most AI courses in primary and secondary schools are taught by information technology teachers, so it is difficult to unify the teaching focus and teaching method. With the rapid development of the basic theory and cutting-edge technology of artificial intelligence, how to make students realize the latest development situation and application of artificial intelligence is also a major problem faced by artificial intelligence education. Therefore, the construction of the AI teaching team in China can refer to the teacher training mechanism of “unified training + regular assessment” in Singapore, so that the teaching staff can maintain their advanced cognition. At the same time, in the stage of higher education and vocational education, China can try to explore the teacher selection and employment mechanism of “double teacher system” that combines full-time and part-time: On the basis of the existing teacher team, select experienced AI engineers as AI teachers to lead students to carry out AI project practice. Through the teacher selection and employment mechanism of “double teacher system”, the educational goal is divided into two parts—theory and practice, and then different teachers conduct teach-

ing according to this teaching goal, so that students can apply what they have learned. In this way, high-level AI engineers can be trained for our country continuously.

5. Conclusion

Under the background of continuous innovation and transformation of artificial intelligence technology, all countries are exploring how to do a good job in artificial intelligence education, the cultivation of professional artificial intelligence talents and mastering the voice in the future era of artificial intelligence. By launching a series of online and offline courses, Singapore has built an artificial intelligence lifelong education system, which has taken the lead in the field of artificial intelligence education and provided reference for artificial intelligence education in other countries. At present, China has formulated a series of AI education policies and continued to promote them. In the future, China should further clarify the development direction of AI education, learn from the experience of AI education in Singapore, and consider China's condition, cultivate people's AI literacy and practical creativity by integrating resources to form a joint force of AI education, building an online and offline learning bridge, and innovating the appointment and training mechanism of AI teacher team. In this way, China will have the guarantee of talents to seize the highland of AI development and push China's artificial intelligence education to a new height.

Conflict of interest

The authors declare that they have no conflict of interest.

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