

# Chapter 15

## Promoting the Popularization of Artificial Intelligence Education



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Qingdao takes the promotion of educational informatization 2.0 as the core, the reform and innovation as the driving force, and the deep integration of educational informatization and education and teaching as the center, and has taken a path of educational informatization in Qingdao.

### 15.1 Outline

*Guidance Outline of Artificial Intelligence Education Curriculum in Primary and Secondary Schools* (hereinafter referred to as “Outline”) defines artificial intelligence curriculum as a course with the characteristics of the times, comprehensiveness and practicality, which is a course that integrates science and humanities, is guided by ability and literacy, is based on the core concepts of artificial intelligence, and emphasizes problem-solving and innovative application.

Accordingly, the implementation of artificial intelligence courses in primary and secondary schools in Qingdao adheres to the target orientation of three-dimensional popularization, expansion and training of excellent courses, pays attention to the cultivation of artificial intelligence disciplines such as computational thinking, technology application and innovation, and intelligent social responsibility, and builds an artificial intelligence curriculum system of “outline first, one course with multiple books and coaches combined”. The top-level leads artificial intelligence education to create a new journey.

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## 15.2 The Classification of Classes

Based on the learning characteristics of students in the basic education stage, Qingdao takes the Outline as the core, carries out innovative research on artificial intelligence education, strengthens the internal relationship between artificial intelligence and information technology, makers, robots, STEAM and programming, and determines the teaching mode of “three sections and four layers” (the three sections are: primary school, junior high school and senior high school respectively; The four levels are: enlightenment in grades 1–3, popularization in grades 4–6, popularization in junior high school + excellent training, and popularization in senior high school + excellent training).

### 15.2.1 *Case: The Enlightenment Teaching Case “Who Moved My Card”*

Students in grades 1–3 are fresh to artificial intelligence, but they are young and have little knowledge of artificial intelligence. Enlightenment teaching is to fully mobilize students’ multi-sensory participation, establish intuitive and perceptual knowledge of artificial intelligence, and cultivate students’ interest in the field of artificial intelligence through the combination of playing artificial intelligence enlightenment videos and game experience activities in class. This lesson example is the process of guiding primary school students to “parity check” two pictures to quickly find out passive cards and complete the game tasks through the game “Who Moved My Cards”. After learning, students can also make card games by themselves, interact with classmates and parents, and achieve the effect of entertaining.

### 15.2.2 *Case: Popularize the Teaching Lesson Course “Exploring the Secret of “Facial Recognition System”*

This lesson mainly teaches the principle and application of face recognition technology in artificial intelligence image recognition, and by feeling the impact of face recognition technology on life and study, it can stimulate students’ interest in learning, and enhance their innovation and inquiry thoughts.

The whole teaching links are: creating scenarios to introduce new lessons, program experience understanding algorithms, task-driven exploration of new knowledge, work display, exchange and sharing, expanding and improving life applications, and applying what you have learned in after-class exercises.

In the classroom, students understand the principle of face recognition through life experience + program experience; Using the combination of Mind + programming and control board, write the access control system of face recognition to further

understand face recognition; Feel the impact of facial recognition technology on life and learning, and enhance their innovation and inquiry.

In the teaching link, the tasks are intertwined and progressive, from shallow to deep, leading students to gradually understand face recognition and logical thinking, and give full play to students' subjectivity.

## **15.3 Teachers Education and Training**

In order to meet the needs of education and teaching, Qingdao is committed to creating a group of "three highs" (high professional quality, high teaching level, high teaching and research ability) famous teachers with Qingdao characteristics to ensure that the curriculum takes root.

### ***15.3.1 Select Teachers and Build a Team System***

Qingdao innovated the path of teacher building, established a "2 + 7" full-time and part-time teaching and research team, and cultivated more than 800 artificial intelligence teachers from information, mathematics, geography, physics and other disciplines through selection, training, teaching and research, and preparation activities, and initially formed a citywide artificial intelligence teacher team system.

Through online popularization and offline special training every year, on-site meetings and high-quality class observation and display activities are carried out every month, teaching and research and preparation activities are carried out every week, so that outstanding teachers can carry out course displays, share teaching experience, and improve the overall teaching ability of the teaching team.

### ***15.3.2 Strengthen Training and Upgrade Teachers' Skills***

In order to improve teaching and practical ability and change the current situation of front-line teachers' general lack of artificial intelligence teaching literacy, teachers are trained in artificial intelligence professional training in batches. In 2021 alone, 34 themed activities, 11 periods of artificial intelligence teacher training, and 20 expert demonstration courses were completed, benefiting more than 1,000 teachers in Qingdao and receiving more than 500 people from Changzhou and other foreign cities.

We comprehensively innovate the training methods of AI backbone teachers, and put the original expert teaching and experience exchange training online. We also carry out project-based training offline, that is, analyze problems in a group cooperation manner according to the specific problem situation, use advanced artificial

intelligence suite, use artificial intelligence image recognition, speech recognition, natural language processing, machine learning and other technologies, according to the way of district and city grouping - group collaboration - production of works - stage display, to provide a platform for each participating teacher to learn from each other and show themselves, and mobilize the enthusiasm of teachers.

### ***15.3.3 Use Theoretical Research to Improve the Quality of Teaching***

Qingdao seized the opportunity and successfully applied for the Ministry of Education's "Artificial Intelligence Education Course Teaching and Applied Research Practice Community", the 13th Five-Year Plan Major Project "Qingdao Primary and Secondary School Implementation of Artificial Intelligence Education Research" and other projects, and successfully completed the final work.

At the same time, the major topics of artificial intelligence education in Qingdao were established, and research results were continuously carried out to form research results from the aspects of exploring the teaching mode of artificial intelligence education courses, building a resource library of artificial intelligence courses in Qingdao, carrying out students' artificial intelligence learning evaluation, and promoting the application of artificial intelligence-enabled education, so as to provide a theoretical basis for the comprehensive popularization of artificial intelligence education in Qingdao.

## **15.4 Improve the Environment and Consolidate the Foundation of Teaching**

Qingdao has built an infrastructure that combines software and hardware, and through the completion and use of supercomputing centers, teaching platforms and artificial intelligence laboratories, it truly solves the problem of "how to teach well" in artificial intelligence courses and attracts students to deeply participate in artificial intelligence learning.

### ***15.4.1 Build a Supercomputer Center to Provide Environmental Support***

In accordance with the requirements of the city's overall planning and the step-by-step implementation of the district and city, more than 70 million yuan was invested in advance to build 5 intensive artificial intelligence education supercomputing centers

with “computing power support, data sharing, and network transmission” at one time, providing a total of 72 CPU nodes and 24 GPU nodes, the maximum concurrency can carry 218 classes at the same time. At the same time, the time-sharing multiplexing method is adopted to increase the overall utilization of the original basic equipment and improve the utilization rate of core equipment.

### ***15.4.2 Upgrade the Teaching Platform to Support Education and Teaching***

In order to enrich the learning experience, comprehensively support AI education and teaching, and build an integrated AI education service platform of “course teaching, content creation, and open source innovation”. Set up an artificial intelligence education course learning system module on the Qingdao education e-platform to provide a one-stop service for artificial intelligence education for teachers, students and education managers of primary and secondary schools in Qingdao. Relying on the artificial intelligence education service platform, it integrates courses, experiments, training, exhibitions and other content, bringing together more than 20 programming modules and more than 100 independent learning projects.

### ***15.4.3 Introduce a List of Laboratories to Lay the Foundation for Construction***

According to the current requirements and future planning, the construction standards of artificial intelligence laboratories that meet the development requirements have been completed, and a list of artificial intelligence laboratories has been introduced, and more than 300 laboratories have been built in total, providing display, experience and operation platforms for more than 200,000 students. In 2024, it is expected to invest 100 million yuan as a whole to complete the popularization of artificial intelligence laboratories and create a number of comprehensive artificial intelligence laboratories integrating “course teaching, application practice, and interactive experience”.

## **15.5 Input Global Coordination to Achieve Full Popularization of Artificial Intelligence Courses**

### ***15.5.1 Embracing Expert Guidance to Optimize Course Implementation***

Relying on the expert team, we will give follow-up and normal communication guidance to schools and teachers. Organize a team of experts to regularly visit the school, listen to the open classes of front-line teachers throughout the process, and inspect the construction and equipment of artificial intelligence laboratories. At the same time, exchange seminars will be held to answer the problems and confusions encountered by schools and teachers in the promotion and teaching of artificial intelligence education, and put forward targeted guiding opinions. Organize a professional team to complete the delivery of courses to the school in the form of sending courses, resources, and experts. In 2021, the teaching team of artificial intelligence doctoral has been organized to visit 22 schools and send 116 high-quality courses covering all sections of primary and secondary schools.

### ***15.5.2 Coordinate Urban and Rural Areas and Carry Out Regular Class Activities***

For some weak districts and cities and weak schools, based on the current situation, “class delivery teaching based on weak schools” has been carried out, through the education development advantage areas to the relatively weak areas to achieve the sharing and exchange of advantageous resources, and the weak areas of education receive the teaching resources of the exporter through the supporting classrooms to solve problems such as weak teachers and lack of educational resources.

### ***15.5.3 Case: “Dream Village-Relay Help” Artificial Intelligence Teaching Activity***

In order to make artificial intelligence education benefit every student in Qingdao City, the Information Center of the District Education and Sports Bureau called on the artificial intelligence professional teachers in the district to dedicate a piece of love to the whole district, set up a volunteer teaching team, take turns to go to the mountain villages, and teach the children on a voluntary basis in the mode of “relay teaching”.

At the beginning of each semester, artificial intelligence teachers in municipal schools in Chengyang District, Qingdao City, will usher in a “fierce competition”.

Some of the teachers who signed up lived in Shangma and Hetao streets in the westernmost part of Chengyang, and some lived in other districts and cities such as Shibe and Licang, although their home addresses were very far away from the schools they taught, they still did not stop the teachers' enthusiasm for dedicating love. Under the organization of the relevant person in charge of the street, they will go to the corresponding mountain school one week in advance to listen to the class, actively communicate, communicate and discuss with the teachers after class, carefully understand the students' learning status and course progress, and then carefully prepare for next week's artificial intelligence teaching course according to the actual learning situation of the students. Every volunteer teacher prepares the volunteer class as if it were an open class, and the exquisite courseware and the board stickers prepared carefully are strong proof. Some teachers even prepared 3D-printed small works and notebooks made by students in their own schools as small gifts to reward children who listened carefully. The volunteer teachers all drove private cars or multi-class buses into the mountain villages to attend classes, and no matter how windy or rainy, they did not leave the children in the mountain villages behind a single artificial intelligence class.

## 15.6 Conduct Assessments to Test the Results of Educational Practices

**Benchmark against the international and build an overall framework.** In line with the International Student Assessment Project (PISA), the "Qingdao Primary and Middle School Students Artificial Intelligence Education Assessment Program" was compiled. The five content systems of perception, representation and reasoning, machine learning, human-computer interaction, and social impact of the three sections are clarified, the four core competencies such as information awareness, computational thinking, digital learning and innovation, and information social responsibility, as well as the three supporting factors of knowledge, skills and attitude, and the overall framework is built on the basis of fully studying the influencing factors and evaluation strategies.

**Diverse evaluation, pay attention to the cultivation of virtue and cultivate people.** Combine test questions, questionnaires with project assessment methods, summative evaluation and formative evaluation, quantitative evaluation and qualitative evaluation, so that students, peers, teachers, schools, regions and parents can participate together, highlighting students' innovative application ability based on real situation problem-solving. At the same time, it pays attention to cultivating morality and cultivating people, organically infiltrates emotion, attitude and value education, and evaluates the degree of good information literacy.

**Analyze data to clarify educational thinking.** 2,441 teachers and more than 160,000 students participated in the evaluation work in the city's schools. The results of the report show that students' awareness of artificial intelligence, application of

intelligent technology, practical innovative thinking, and intelligent social responsibility have been greatly improved, and teachers have been significantly stimulated and improved in terms of role reshaping, subjective awareness, and teaching effectiveness.

## **15.7 Strengthen Publicity and Tell the Story of Qingdao's Artificial Intelligence Education**

Qingdao Municipal Education Bureau implemented “platform thinking” and established the International Artificial Intelligence Education Alliance to achieve multi-party cooperation and innovation between government and enterprise research and learning. Regularly carry out on-site meetings, seminars and exchange meetings on artificial intelligence education to summarize the typical experience and practices of artificial intelligence education in Qingdao. Through the “International Alliance for Artificial Intelligence Education” public account, website, special newspapers and briefings and other multi-level and multi-channel publicity work, more than 300 publicity manuscripts have been carried out, creating an official publicity platform for artificial intelligence education to the outside world. At the same time, it pays attention to external publicity, and has published nearly 100 reports in global network, China Net, Guangming Daily and other media, and exported the rich experience and practices accumulated in the curriculum promotion mode and enabling application of artificial intelligence education.

The intelligent era of “human–machine collaboration, cross-border integration, co-creation and sharing” has arrived, cultivating a large number of high-end artificial intelligence talents with innovative ability and cooperation spirit is the mission of artificial intelligence education, Qingdao will explore the construction of a new artificial intelligence talent training system as its own responsibility, continue the spirit of the International Education Informatization Conference, promote education and teaching innovation supported by new technologies, and contribute Qingdao strength to running a satisfactory education for the people.