



Proceeding Paper

The Exploration of High Quality Education in Scientific and Technological Innovation Based on Artificial Intelligence [†]

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Abstract: This paper explains that setting up artificial intelligence courses can clearly enhance students' interest in high technology, boost learning confidence and promote students' overall development in the following three aspects: the significance of artificial intelligence education to students, the confusion regarding artificial intelligence teaching in this stage, especially in rural middle schools, and some related suggestions.

Keywords: artificial intelligence; quality education; scientific and technological innovation

1. Introduction

General Secretary Jinping Xi highlighted that we should vigorously promote the development of the internet, big data and artificial intelligence in the report of the 19th national congress. In July 2017, the State Council issued a development plan for a new generation of artificial intelligence, which put forward the following goals: to set up artificial-intelligence-related courses in primary and secondary schools, gradually promote programming education and encourage social groups to participate in the development and promotion of software programming lessons that combine teaching with fun [1]. Our school is a first-class Provincial-Level Pilot Demonstration High School. In order to respond to the call of the state and adapt to the times, we actively explored and undertook the construction of an artificial intelligence robot laboratory, the development of science and innovation courses and the cultivation of quality talents, and we achieved certain results. This paper describes the related work, which can be used as a reference for researchers.

2. Biased Understanding of Existing Quality Education

Since the publication of the decision to deepen educational reform and comprehensively promote quality education, it has triggered a series of reflections and discussions on high quality education in the educational system and all sectors of society. But today, most parents still think that quality education constitutes singing and dancing, and few people pay attention to the all-round development of children's morality, intelligence, physique, beauty and labor. Artificial intelligence simply corrects these cognitive shortcomings of parents.

3. The Significance of Artificial Intelligence Education to Students

3.1. Innovating the Teaching Mode and Enlightening Students' Thinking

In the traditional teaching mode, generally, the teacher stands on a platform and the students passively accept this, which is called the cramming teaching, while in the teaching mode of artificial intelligence, teachers are simply guides, organizers and collaborators who are effective in guiding students to find and solve problems, thus stimulating students' interest in learning, which is more in line with the new modern education mode [2]. For example, we can explain scratch graphical programming, where the students watch the



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examples, read the original program, write the examples themselves, learn the grammatical structure, and the teachers answer questions. Students are not only planners but also implementers of this teaching model, combining theory with practice; the student is not only the director but also the actor. This enables students to actively explore and analyze problems, encourages students to actively use their brains and mobilize all their body functions, stimulates students' multiple sensory abilities, causes them to become deeply impressed, improves their capacity for understanding, enables students to access a space for independent exploration and lays a foundation for their independent learning. It also organically yields a perfect combination of practice and theory.

3.2. Integrating Subject Knowledge and Improving Practical Ability

Artificial intelligence involves the programming of language, algorithm design, sensing, motion, control and other forms of knowledge, among which the programming of language and algorithm design require students to have a good mathematical foundation and logical thinking ability; sensing, motion and control require students to have a good command of physics; and debugging requires students to have a good team spirit and cooperation ability. Therefore, artificial intelligence is also the embodiment of students' comprehensive qualities [3]. During artificial intelligence training, our students taught themselves C language, Easy language and some circuit operation knowledge throughout their summer and winter vacations in order to improve their skills. Some students even learned relevant college physics, chemistry, advanced mathematics, calculus and algorithm design, which not only cultivated their interest in learning, but also greatly improved their academic performance. They not only won the provincial first prize in many youth science and technology innovation competitions and robot competitions but also gained entry to their 985 and 211 ideal universities, with excellent performances in the national college entrance examination, such as Fudan University, Sichuan University, Nanjing University of Aeronautics and Astronautics, Xihua University, etc.

3.3. Creating Team Spirit and Sublimating Students' Emotions

Most of today's students are only children lacking life experience, failing to deeply understand the hard work and intentions of their parents, elders and teachers. The implementation of artificial intelligence is a project-based teaching method in which teachers put forward some questions, while students discuss and write plans in groups; then, the teachers review and question the students' work, the students consult materials, repeatedly explore topics and draw conclusions, and the teachers summarize and provide comments. In this process, students need to do everything by themselves. This enables students not only to learn knowledge and improve their ability to comprehensively analyze and solve problems but to understand the ardent hopes and wishes of their parents, as well as the expectations of their teachers, and to experience team spirit as though sailing together in the same boat over thousands of miles through the wind and waves so as to achieve the purpose of cultivation. For example, for the project "a toilet assistance system for the elderly and hemiplegic patients", we set up four groups: a program group, in which the members racked their brains for a solution to a problem; a hardware group, in which the members worked hard and adjusted repeatedly in order to achieve a building in the best state; a logistics group, in which the members tirelessly strove to buy materials; and a finance group, in which the members lobbied sponsors to assist in the program financially. Having experienced these difficulties, every member found that it is not easy to do one thing well and came to truly understand that unity is strength. Thus, the program also sublimates the emotional education of "the importance of living, learning, gratitude and team spirit" for students.

4. Confusion in Artificial Intelligence Education

4.1. Confusion in Conceptual Understanding

At present, artificial intelligence is a focal topic in the IT field. It plays on concepts, involves gimmicks and replaces flowers with trees. Artificial intelligence is a basket into which everything can be placed. All kinds of pseudo-artificial intelligence are popular, disturbing the audio-visual realm and causing great harm. Many students are still confused about artificial intelligence. They cannot distinguish between robots, games, big data technology, cloud computing, automation systems and artificial intelligence. Professor He Huacan noted that the current artificial intelligence is mostly a set of encapsulated programs written according to human thinking, which cannot reflect the attributes of artificial intelligence in essence. The best example is driverless cars. Therefore, can artificial intelligence imitate people in performing some simple tasks? Does artificial intelligence have full human thinking, and can it make all kinds of judgments in a complex environment? The definition of artificial intelligence requires further discussion [4].

4.2. Confusion about Teaching Content

Artificial intelligence, abbreviated as AI, is a new technical science that studies and develops theories, methods, technologies and application systems for simulating, extending and expanding human intelligence (from Baidu).

Artificial intelligence is a science and technology based on computer science, biology, psychology, neuroscience, mathematics and philosophy. One of the main driving forces of artificial intelligence is the aim to develop computer functions related to human intelligence, such as reasoning, learning and problem-solving ability (From Zhi Hu).

From the above definitions, we can see that artificial intelligence is a comprehensive discipline whose research fields involve robotics, language recognition, image recognition, natural language processing and so on. It encompasses too much knowledge. However, in middle schools, teaching content is still the theoretical basis of office system software and information technology. There are few systematic textbooks on artificial intelligence written for middle school students. While there are a wide variety of programming software tools related to artificial intelligence in the market, most of which were developed by educational product R&D institutions, the engineers of these R&D institutions have little understanding of students' psychology and physiology when developing these products and do not fully consider the educational scene. They mainly serve to advance their own educational products. Therefore, this has caused some confusion regarding information technology among teachers and students not knowing where to start with artificial intelligence teaching. For example, we have the Python language, C language, C++ language and scratch software, and each company has its corresponding graphical programming, with dozens of programming software types. Therefore, the unification of standards is imminent.

4.3. Confusion about Teachers' Qualities

Artificial intelligence is a comprehensive interdisciplinary subject which places high requirements on teachers. In most schools, artificial intelligence is taught by teachers of physics, information technology, chemistry and biology and other teachers lacking comprehensive and systematic artificial intelligence knowledge [5]. The level of teaching is uneven, and schools are short of funds; hence, it is difficult to guarantee the training and learning of professional teachers of artificial intelligence, and the growth rate of teachers is slow, which leads to some difficulties in artificial intelligence teaching and limits students' understanding and mastery of artificial intelligence.

4.4. Confusion in Finance

Artificial intelligence is a cutting-edge discipline with high requirements for hardware and software configuration, which requires independent artificial intelligence teaching rooms, computers, sensor parts, 3D printers and some maker experimental tools. The

replacement rate of accessories is very high. Sometimes, a part or a sensor costs as much as several hundred yuan, and some can cost thousands of yuan or even higher, which is undoubtedly a great barrier for county-level middle schools with insufficient funds and rural students from poor families, thus hindering the construction and promotion of artificial intelligence.

5. Solutions to the Confusion Regarding Artificial Intelligence Education

5.1. Raising Money from Various Sources and Ensuring Funds

As the saying goes, “before soldiers and horses move, food and grass come first” and “having food in your hand, not panicking in your heart”, capital guarantee is the premise of success. In order to ensure the smooth implementation of artificial intelligence in primary and secondary schools in counties, towns and townships, the government should set up special funds for scientific research and development [6], raise an artificial intelligence foundation to allow people from all walks of life to participate in the construction of artificial intelligence and help individual schools, teachers and students with difficulties and those having made outstanding achievements, and establish an artificial intelligence association to provide organizational support and financial guarantees for the establishment of artificial intelligence competitions and regular academic seminars on artificial intelligence.

5.2. Vigorously Reserving Talents and Ensuring Teacher Availability

Adhering to the strategy of “Come out, and bring in”, we should invite AI experts and scholars to give lectures, organize teachers to study in Chengdu, Shanghai and other places in batches, and build on the cooperation of schools with colleges and universities to provide better teaching environments and teacher guarantees for AI teaching. The government should offer policy support to provide a certain level of autonomy and priority for the selection of excellent teachers so as to improve the overall level of teaching.

5.3. Making Every Effort to Optimize Teaching Materials and Doing a Good Job in Position Support

To achieve sustainable and good development, a school must obtain three “assets”: funds, talents and teaching materials. Obviously, teaching materials can clarify a direction for teachers, consolidate their position and ensure that students take fewer detours. They are not only the specific basis enabling teachers to teach and do a good job in teaching and educating people but also an important tool enabling students to obtain systematic knowledge, develop intelligence and improve their ideological and moral consciousness so as to render the knowledge obtained more systematic and standardized. Therefore, it is essential to organize experts and professors in compiling more systematic textbooks on artificial intelligence for primary and secondary schools at different levels and establish competitions according to the latest development trends of artificial intelligence under the unified, national standard of artificial intelligence. It is necessary to compile school-based textbooks in light of the real context of the county and the school.

6. Conclusions

To sum up, setting up artificial intelligence courses can enhance students’ interest in high technology, boost their learning confidence and promote their overall development. Although we will encounter many difficulties in this process, we believe that with the support of national policies, the help of all sectors of society and the joint efforts of school leaders and teachers, we will become better.

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