

Research on Parents' Awareness of Children's Programming Education in the Age of Artificial Intelligence--Taking Ningxia Guyuan City as an Example

Gao Zhu¹, Huang Dengpeng²

¹Ningxia Normal University, Guyuan, 756099, Ningxia, China

²Ningxia Guyuan Education and Sports Bureau, Guyuan, 756099, Ningxia, China

Abstract: Since the Ministry of Education's circular on the issuance of the Outline of Guidance for Primary and Secondary School Information Technology Courses (Trial) in 2000, the first batch of students who received information technology education at the compulsory education stage have become parents. Today, more than two decades later, this group of parents, faced with the fast-developing artificial intelligence era, have found that the study of the environment and current situation of children's programming education and their knowledge of children's programming education has found that: parents have a better understanding of the artificial intelligence devices and children's programming education in their environment. Parents' computer literacy has been greatly improved and they pay more attention to their children's computer education. Parents have their own views on their children's development of computer thinking and learning child programming. Parents are positive about the effect of computer education. It is hoped that the results of this study can provide information for the research on the development of children's programming education and the improvement of children's programming teaching methods.

Keywords: artificial intelligence; computer thinking; programming education

1. Introduction

1.1. The need for research

In 1956, McCarthy proposed the concept of "Artificial Intelligence (AI)" at the Summer Symposium on Artificial Intelligence at Dartmouth. In 2016, the world's attention was focused on the human-computer Go wars, and after many rounds, the Alpha Go Robot won a great victory. In 2022, the ChatGPT was introduced, which not only knows astronomy and geography, but also can simulate the human mind chatting in context. Artificial intelligence-driven tools and technologies have contributed to the progress of society and disrupted the field of science and technology.

Programming, as a basic computer discipline, is not only a language for communicating with computers, but also a link for communicating with intelligence, as well as a method and foundation for realising AI. It has been found that children around the age of 4 have the cognitive level to understand basic computer programming concepts [1]. As a result, the educational community has begun to try to cultivate children's computational thinking ability, such as the United States has opened a 4 to 7 years old age group to cultivate computational thinking related courses, the International Computer Science Teachers' Association (CSTA) has also put forward the need for K-5 children to master the modularity of the visual programming language and the ability to test the programme [2]. Although computational thinking has jumped out of the "think like a computer" programme thinking category, but it is undeniable that for ordinary individuals, actively learning programming knowledge, hands-on programming practice can play an extremely important role in the formation of computational thinking [3]. 2017 the State Council issued a "new generation of artificial intelligence development plan" proposed to promote programming in primary and secondary schools. In April 2018, the Ministry of Education issued the Action Plan for Artificial Intelligence Innovation in Higher Education, further clarifying that "the construction of a multi-level education system for artificial intelligence, and the introduction of artificial intelligence popularisation education in primary and secondary schools"[4]. On January 19, 2019, the Ministry of Education held a conference in Beijing on the theme of "Artificial

Intelligence in Higher Education". On the 19th, the Ministry of Education held a conference on the project "Artificial Intelligence Education in Primary and Secondary Schools" in Beijing, identifying the five cities of Beijing, Guangzhou, Shenzhen, Wuhan and Xi'an as the first batch of pilot cities for AI education, and the pilot has been carried out comprehensively for students from grade 3 to grade 8 in 2019 [5]. In the same year, the Ministry of Education's Circular on the Highlights of Education Informatisation and Cybersecurity Work in 2019 re-emphasised the setting of AI-related courses at primary and secondary school levels and the gradual promotion of programming education. At the same time, the first set of AI teaching materials in the country entered primary and secondary schools in Shanghai for piloting.

1.2. Significance of the study

As AI education gradually enters students' various learning stages, parents' attitudes towards programming education also affect their awareness of cultivating their children's programming and computational thinking skills. 2022 China Internet Network Information Centre (CNNIC) 49th Statistical Report on the Development Status of the Chinese Internet pointed out: as of December 2021, the number of Internet users in China had reached 1.032 billion, of which the number of 20-49 year-old Internet users accounted for 1.8 billion. The number of Internet users aged 20-49 accounted for 55.6%, and it is obvious that this kind of Internet users covers the vast majority of parents in primary and secondary schools. In the era of artificial intelligence, parents' computer literacy and views on computer programming education are affecting the growth of this generation of "digital natives". As the lifelong teachers of their children, their computer literacy and understanding of children's programming education have a great impact on the correct guidance of programming education for their children.

2. Research issues

In 2000, the Ministry of Education issued a circular entitled "Information Technology Curriculum Guideline for Primary and Secondary Schools (for Trial Implementation)", which decided to introduce Information Technology (IT) courses in primary and secondary schools across the country [6]. In the early days, the "Information Technology" course mainly introduced the basic knowledge of computer and the basic operation of computer systems. With the rapid development of the Artificial Intelligence era, the curriculum is not only richer and more diverse in content, but also covers areas of knowledge that are incomparable to the earlier curriculum. Contemporary parents happen to be the first batch of students to receive the course of Information Technology. In the face of the rapid development of the age of artificial intelligence, the following four issues are mainly studied for better education on artificial intelligence:

- computer literacy of participants;
- the current situation of AI education in Guyuan City, Ningxia;
- parents' awareness of children's programming education;
- children's learning of programming.

By collating and analysing the results of the study, the computer literacy of parents will be improved, which will provide a reference for the development and improvement of children's programming education in Ningxia.

3. Research Participants and Methods

3.1. Research Participants

The five participants in this study were all parents of students in Guyuan City, Ningxia, whose families involved 11 children, and the participants are shown in Table 1.

The number of children who are learning programming is 5, of which 3 are girls and 2 are boys. Programming was studied for 1 semester by 3 and for 2 semesters by 2. The children of the participants are shown in Table 2.

Table 1 Participants' profile

participants	sex	age	careers	educational attainment	Number of children	Number of children learning to programme
P1	female	37	profession	undergraduate	2	2
P2	female	34	Heads of educational institutions	undergraduate	3	2
P3	female	41	housewife	congrats	2	0
P4	male	35	a private firm	branch	2	0
P5	female	38	Director of Kindergarten	branch	2	1

Table 2 Table on children of participants

participants	kid	sex	age	Whether to learn programming	Time spent studying programming (in semesters)
P1	C1	female	9	yes	1
P1	C2	female	5	yes	2
P2	C3	female	11	no	0
P2	C4	male	8	yes	1
P2	C5	female	4	yes	1
P3	C6	female	16	no	0
P3	C7	female	5	no	0
P4	C8	female	6	no	0
P4	C9	female	4	no	0
P5	C10	male	11	yes	2
P5	C11	female	3	no	0

3.2. Research Method and Process

The research method of this project is the focus interview method in qualitative research. According to the research objectives focus interviews focused on the participants' learning and knowledge of computers, the participants' knowledge of the AI education environment in Ningxia Guyuan, the parents' knowledge of children's programming education and their children's learning of programming, and other aspects of the discussion.

Participants signed a consent to participate form prior to the focus interview, allowing the use of personal information for this study. The interviews lasted approximately one hour and were audio-recorded throughout. During the interview, participants spoke freely about the issues raised. The determination of the appropriateness of the qualitative research was taken from the results of the triangulated validation, which was analysed and validated by three professional professors who agreed with the findings. After the focus interviews were completed, the recordings of the interviews were transcribed and reviewed twice to write the textual material of the interviews.

4. Research Findings

According to the combing of the interview text material, the interviews were selected and summarised to complete the statistical table of findings in Table 3.

Table 3 Statistical table of findings

issues	area	Content (transcription)	participants
Computer Literacy for Parents	Computer studies	Information Technology courses have been taken in junior and senior high school	P1, P2, P4, P5
		I didn't learn much in high school, and the teachers weren't very good at teaching it.	P3
		Studied electrical automation at university, learnt CAD, microcontroller programming, never studied computer knowledge after graduation	P4
	Passing of computer level exams	High School (Pangyang County, Guyuan City) Memorised typing word roots and took computer level 2 in college. Learned office software, Photoshop, CAD, web production	P1
		The school requires high school to pass the computer level exam Grade 2 (Shandong). Have taught myself CAD, Dreamweaver, Fireworks and other software	P2
Status of Artificial Intelligence Education in Guyuan City, Ningxia	artificial intelligence environment (AI)	There are unmanned supermarkets	P3
		There are Guyuan City Youth Demonstration Comprehensive Practice Base, Guyuan City Red Cross Reserve Earthquake AI Experience Room, Guyuan City Science and Technology Museum Robot Exhibition Hall, etc.	P2
		Frequent use of fingerprint recognition, face payments, etc.	P4
	State of Artificial Intelligence Education	Knowing Ningxia "Internet + Education"	P1, P2
		Seven Little AI Classroom invests hundreds of thousands of dollars	P5
		Information Technology Curriculum from the third year of compulsory education, one lesson a week	P1
Parents' perceptions of children's programming education	The current state of programming education for children	There are a number of children's programming education and training institutions outside the school in Guyuan City, one in Wanhe, one opposite to the seventh primary school, one opposite to the sixth primary school, one in Hongbao Children's City, one in the museum and so on.	P1
		After enrolling my son in a programming class, introducing programming into kindergarten for young children to receive programming education, the enrollment is high and can be used to write music using the music module	P5
		Children's programming level examination registration fee higher level through the examination can be applied across the level, the city of Guyuan did not set up the examination point	P1
	Parents' perceptions of children's programming education	Low awareness of programming for children	P3
		Maths fundamentals are important, no plans to enrol in children's programming	P4
		Desperate to enrol your child in children's programming training	P2
		To make my child happy, so I enrolled in a children's programming training course	P5
	Children's learning of programming	Pathways to Learning Programming	Enrolment in children's programming courses
Self-taught programming by watching videos at home and passed the ECS Level 1 Programming for Kids exam			P1
Learning and effectiveness		Attempted to learn beginner programming at age 3 and had problems with programming module activities	P1
		5 year olds will copy others and choose unique routes to complete tasks	P2
		Maths, memory improvement	P5
		Can't see programming making a difference in the short term	P2, P5

4.1. Computer literacy of the participants

First of all, the participants have studied the course "Information Technology" in compulsory education, and there are two people who passed the computer grade exam. There is a clear difference between computer class education and the region, and the passing of computer grade exams is very much related to their level of education. Some parents indicated that they did not know enough about computers during their studies and were not very sure about their teachers' teaching ability. three parents who had studied at university had passed the National Computer Grade Examination (Level 2), and P1, who had studied in Shandong, had passed Level 2 of the Grade Examination when he was in high school.

Secondly, parents also learnt some specialised software in computer through teaching and self-study methods during the period of studying in university and working. It was found in the survey that more knowledge about computer was learnt during university and work, and there was a close connection between education and his high computer literacy.

4.2. The environment and current situation of AI education in Guyuan City, Ningxia Province

Parents are aware of the AI education environment in Guyuan City and use related AI products and tools in their lives. They are more concerned about the AI-related Guyuan City Youth Demonstration Comprehensive Practice Base, the Guyuan Red Cross Reserve Earthquake AI Experience Room, and the Guyuan Science and Technology Museum, and visit them with their children. The Seventh Primary School in Yuanzhou District, Guyuan City, has built an AI classroom and pays more attention to AI education. Primary schools at the compulsory education stage start to prefer the "Information Technology" course from Grade 3, 1 section/week.

4.3. Parents' awareness of children's programming education

Parents are aware of the children's programming training institutions in Guyuan City, and have children who have participated in programming learning in the training institutions. As for schools, parents were very positive about the school-based programmes related to artificial intelligence and programming offered by the schools, and the schools also conduct various competitions and school-based programmes on computers. Although primary and secondary schools offer courses on Information Technology, specialised courses such as Artificial Intelligence and Programming have not been incorporated into the primary and secondary school curricula for the time being. On the part of parents, some think that they should learn programming as early as possible, while others think that Mathematics is fundamental and do not consider their children learning programming.

4.4. Children's Learning of Programming

The number of children learning programming accounted for 45% of the participants, with the youngest starting to learn at the age of 3 and the oldest at the age of 10. 80% of the children learnt programming by attending children's programming training courses, and individual parents helped their children learn on their own with the help of video materials and obtained the Level 1 Certificate of Children's Programming of the Electronic Society in Primary 2, and they hope to continue learning to obtain higher-level programming certificates.

5. Discussion

Firstly, AI education cannot be separated from the strong support of the country and the region. Ningxia Guyuan City belongs to the western underdeveloped region, and AI education is relatively backward, which is obvious to parents. But in recent years, the construction of AI education environment in Guyuan City has been outstanding. In order to promote the development of education informatisation in the new era, actively and steadily promote the construction of the "Internet + education" demonstration area, strive to achieve fair and quality education, and do a good job of people's satisfaction with education, according to the "Ministry of Education on the issuance of the "Education Informatisation 2.0 Action Plan" notice" (Teaching Techniques (2018) No. 6), 2018 In July, Ningxia was approved by the Ministry of Education to become the first "Internet + Education" demonstration zone in China. In accordance with the requirements of the Notice on the Construction Plan for the "Internet + Education" Demonstration Zone of Ningxia Hui Autonomous Region (2018-2022) (Ningzhengfa [2018] No. 49), the construction plan for the "Internet + Education" demonstration zone of the Ningxia Hui Autonomous Region (2018-2022) was approved by the Ministry of Education. 2018-2022) Ningxia as the first province in the western region to achieve basic balanced development of compulsory education in the county. A number of schools have become "Internet + Education" demonstration schools, Xiji County Vocational High School in Guyuan City, and the Fourth High School in Pengyang County, Guyuan City, as the first batch of pilot colleges and universities. 2019 Notice of the Department of Education on the issuance of the "Pilot Work Programme of Artificial Intelligence-assisted Teacher Team Building Action in Ningxia", and Ningxia Normal College, located in Guyuan City, has been selected as a experimental school for teacher training. The level of AI education in Guyuan City will be greatly improved, with some primary and secondary

schools and kindergartens constructing AI creator classrooms, and the education sector carrying out AI activities of various kinds one after another. Artificial intelligence and children's programming training institutions in the community are growing and carrying out activities as if they were springing up.

Second, parents' computer literacy enhancement is closely related to the IT programme. The parents who participated in the interviews had received IT education in junior and senior high school, but there was no lack of uneven education level among them. Attaching importance to IT education, parents' computer literacy gradually improves, enabling them to better integrate into the AI era and become the helmsmen of the new era.

Thirdly, parents rationally understand children's programming education and improve their children's interest and confidence in programming learning. Some parents think that the short-term effect of programming education is not obvious. Programming education is not a one-step, one-learning process. The learning process should focus on cultivating the spirit of inquiry and innovation. When faced with problems in programming, one can seek help from professional teachers. Reduce the frustration of programming and improve the ability to analyse and solve problems. Parents are more positive about their children's participation in programming competitions and examinations. And some participants think that mathematical thinking is the foundation, cultivate children's mathematical thinking well, and then learn computer programming according to their interests when they grow up. There are also participants who enrolled in computer programming courses because their children like programming. There are participants who urgently hope that their children start to have programming enlightenment and training of computational thinking at an early age. A 7-year-old child learnt on his own entirely from videos and took the Youth Programming Level Exam (Level 1). There are plans to continue learning in the future, and he is ready to achieve the goal of taking Level 3 across the levels by the end of 2021, and try to pass the Level 4 exam. an 11-year-old child has systematically learnt a year's course on mechanical construction and programming, and recently represented Guyuan City to participate in the region-wide programming competition. However, some parents are not optimistic about the environment of the children's programming examination in Guyuan City, and the lack of special examination centres and the high cost of the examination are prominent issues.

6. Conclusion

In the face of the development of AI, we found that parents are rationally aware of the concepts of AI and children's programming and have first-hand experience of AI environments. Parents will take their children to AI scenario places for visiting and experiencing. Parents participating in the interviews have high computer literacy, have their own understanding of computer programming education, and understand the environment and current situation of computer programming education. Parents are able to rationally understand computer programming education, and parents will let their children learn programming according to their children's hobbies. Children mainly learn computer programming through training or self-study.

From the results of the study, we can see that although it is located in an underdeveloped area, the computer literacy of parents in Guyuan City, Ningxia is not at a low level. This will be conducive to the development of children's programming education and the deep integration of artificial intelligence in Guyuan City, which will provide information for the development of children's programming education in Guyuan City and the improvement of research on children's programming teaching methods.

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