

# The Transformation of Preschool Education in The Era of Big Data and Artificial Intelligence

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## Abstract

**With the rapid development of information technology, there are various intelligent technologies, such as face recognition, emotion recognition, voice recognition, image recognition and so on. Big data and artificial intelligence play an important role in education, medicine, manufacturing and other industries. For preschool education industry, first of all, the renewal of the information technology can effectively help children and teachers' rapid access to information, processing and share information, so as to improve the teaching quality of teachers and children's learning efficiency. Thirdly, according to the data analysis provided by big data and artificial intelligence, artificial intelligence can accurately assess children's learning status, guide teachers to formulate targeted teaching plans, and carry out children's personalized learning. Thirdly, through the information sharing of big data and artificial intelligence, the education gap between regions can be narrowed and the education equity can be improved.**

## Keywords

**Artificial intelligence, Preschool education, Education equality, Education quality.**

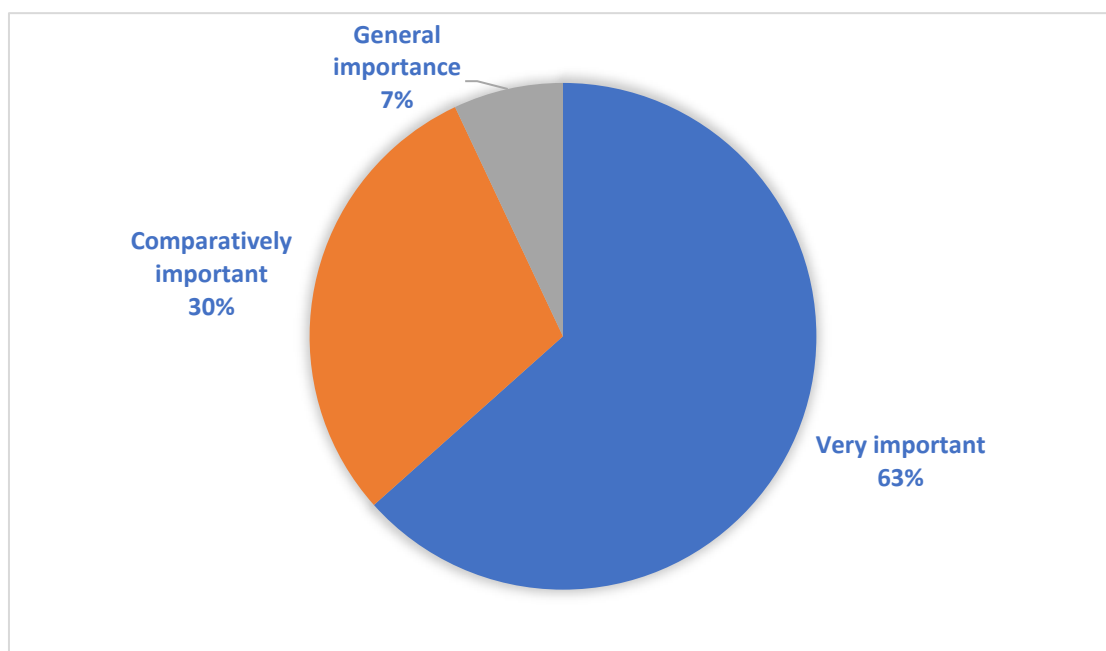
## 1. More Intelligent Reading Children

Preschool children come from different families, have different personality characteristics and cognitive development degree. Because children's learning needs and hobbies are different, and the traditional classroom teaching method is often based on the class unit, it is difficult to adapt to the individual teaching needs of each child. While most families currently buy smart devices like Tmall Genie that can bring more fun to children, their communication modes are too mechanical and lack the flexibility to allow preschool children to get personalized learning. First of all, people use artificial intelligence methods to identify children's emotions and facial expressions, and achieve accurate interpretation of children's emotions through big data collection and analysis. In class, teachers can adjust the difficulty, progress and rhythm of teaching materials according to children's emotional feedback, so as to better meet children's learning needs. Secondly, the method of interaction between AI and children is used to accurately analyze the learning characteristics of children, and the corresponding personalized teaching is designed and pushed according to the specific situation of each child. Only through the above two points can we achieve "individualized teaching", so that every child can obtain comprehensive development. Third, compared with traditional teaching, AI technology not only improves the interest of teaching, but also greatly increases the interaction of children. Children no longer passively receive information, but actively explore scientific knowledge independently in the learning process of interacting with the wisdom system, so as to enhance their learning motivation and effect.

## 2. The Construction of High-quality Information Literacy Kindergarten Teachers

In the information age, improving the information literacy of preschool teachers is the premise of cultivating high-quality preschool teachers. Information literacy of preschool teachers means that preschool teachers should be able to use a variety of artificial intelligence big data learning tools to provide children with efficient, convenient, interesting, personalized and diversified interactive learning. This requires teachers to have a complete understanding of the application of artificial intelligence technology in teaching, which is specifically manifested in a certain understanding, understanding and application of teaching content, teaching objects, teaching methods, teaching means and teaching results. And in the repeated study and research and teaching practice, preschool education teachers can gradually master the new technology and technology teaching methods, and combine artificial intelligence with education and teaching. So as to meet the demand of high-quality preschool education teachers, provide a strong talent guarantee for the realization of the digital transformation of preschool education, and make children's quality education a reality [2,3,4].

Through visiting three kindergartens in Shanghai and conducting a questionnaire survey on their kindergarten teachers, it is found that 63.4% think it is very important, 29.6% think it is relatively important, 7% think it is generally important, and no one thinks it is not important. As shown in Figure 1. In the survey on whether preschool teachers are willing to receive information technology training and what kind of training they should receive, it is found that 44% of them want to receive basic knowledge and skills training on computers and networks, and 63.7% want to receive training on the application of information technology in preschool education for preschool children at various stages. 65.7% hope to receive training in the operation and application of hardware facilities such as multimedia equipment, and 65% hope to receive training in the use and application of software resources in kindergartens. The result shows that our preschool teachers have high information literacy, but also have a strong willingness to learn independently.



**Figure 1.** Attitudes of Information Technology in Supporting Personalized Learning for Children

### 3. Establish A New Teaching Model

With the application of big data and artificial intelligence, the teaching model is also changing. Teaching is no longer as simple as the teacher talking and the child listening. Big data can bring a large number of educational resources for teachers, including pictures, videos, audio, etc., which can not only change the way of classroom education, enrich the teaching content, but also allow children to have a more intuitive perceptual understanding of the content. The application of artificial intelligence in the classroom can help teachers understand the actual learning state of children at that time, and carry out targeted teaching according to children's learning differences. This gives the child a deeper understanding of what is being studied and the ability to improve. Big data and artificial intelligence and other scientific and technological means can also bring new opportunities for the development of rural education in China, such as: the use of big data and artificial intelligence, to achieve the sharing of teaching resources, so that rural children can also have access to high-quality educational resources, and further promote educational equity.

This project will carry out experiments in Child A to compare children's learning effectiveness under three traditional classroom modes, network interaction modes and big data and artificial intelligence interaction modes. The study found that the use of big data and artificial intelligence technology can make children have a deeper understanding of what they learn and improve their ability.

**Table 1.** Scenarios and evaluations of three traditional classroom modes, online interaction modes, and big data and artificial intelligence interaction modes

Scene: Child A is building blocks	Traditional classroom mode	Network interaction mode	The interaction mode between big data and artificial intelligence technology
An An was building blocks in the kindergarten classroom. She wanted to build a city, but she only built a few houses before stopping	Teacher's inspiration: Little A, is a city just a few houses? Do you want to make your city more diverse?	Xiao A had a conversation with Tmall Genie, and Xiao A explained that he wanted to build a city. Tmall Genie replied, "Then let's go build it, and the teacher will search for a large number of pictures about the city on the internet."	Proactively perform facial recognition on Little A and greet them to attract children's attention and interest. Little A has a conversation with them, explaining that they want to build a city and actively conduct online searches to provide a large number of suitable photos and create different scenes. Then, they ask Little A about his intention to build, provide suitable scenes, and invite Little A to build with other children
	Interactive result: Xiao A built more houses	Interactive result: Little A spent a lot of time choosing his favorite pictures	Interactive result: Little A builds with a few children and can continuously collaborate to come up with new ideas
	Evaluation: The teacher's expression is unclear and their level is limited, which limits children's cognitive development. Therefore, in this mode, improper or ineffective guidance may occur.	Comment: The interaction between Tmall Genie and humans is rigid, and anyone who asks will get the same answer with the help of a teacher.	Evaluation: This teaching model first stimulates children's interests, and the interaction with children is real and effective. It comprehensively analyzes Little A's age, likes, and ideas, and provides personalized teaching plans.

Through the field visit and in-depth investigation of a kindergarten in Shanghai, we found that this kindergarten has a high level of foresight and innovation in children's education. There are special intelligent exploration Spaces in the kindergarten, including "Space exploration camp", "Robot intelligent Exploration Room" and "nature exploration room", aiming to stimulate children's interest in space, science and technology and nature, and cultivate their spirit of exploration and innovative thinking. "Space Exploration Camp" is a major feature of the kindergarten, which provides children with rich space exploration resources. In this space, children can learn about the mysteries of space by watching 3D stereoscopic images, touching astronaut models and aviation models. In addition, the kindergarten has designed a variety of educational activities in conjunction with the special curriculum of "Space Exploration Camp", so that children can learn in games and grow up in learning. The "Robot intelligent exploration Room" is another highlight of the kindergarten. This space is equipped with a sufficient number of robots, ipads, multimedia equipment, etc., and is a practice place for the kindergarten's characteristic robot courses. Here, children can operate the robot by hand, and through group cooperation, teacher teaching and demonstration, they can deeply understand the operation principle of the robot, and cultivate their hands-on ability and innovative thinking. The "Nature Exploration Room" is a good place for children to get close to nature and learn about nature. In this space, children can understand the operation of nature by observing natural specimens and participating in environmental protection activities, so as to cultivate their environmental awareness and responsibility. In general, this kindergarten makes full use of intelligent exploration space, through rich curriculum design and activity arrangements, so that children can learn and grow in exploration, not only cultivate their innovative thinking and exploration spirit, but also make them harvest rich knowledge and skills in a pleasant atmosphere.

#### 4. Construct New School Management

The application of big data and artificial intelligence provides a new "people-oriented" intelligent campus management model. Big data and artificial intelligence can keep children safe; A child is a juvenile whose legitimate rights and interests need to be guaranteed. With the online news media constantly reporting on the abuse of pre-school children, there is increasing concern about the safety of pre-school children. In traditional teaching methods, accidents are usually noticed and solved after the occurrence of the incident, so the prevention must be strengthened in advance. Big data and artificial intelligence make this possible. For example, with the help of big data, artificial intelligence and other means, the actual situation of the crime scene is recorded in real time through a full range of video recordings, and through facial feature recognition and early warning and other means to achieve accurate recording of crimes and timely alarm. The establishment of big data and intelligent teaching management system is of great significance to the realization of individualized education for students. Using big data and artificial intelligence technology, children's age, interests, physical characteristics, learning behavior, activity behavior and other aspects are collected and processed. This allows the kindergarten to have a clear understanding of each child's overall development status and characteristics, so as to help them develop a comprehensive and personalized teaching plan, so that children can better develop their great potential.

A person in charge of a kindergarten in Shanghai was interviewed about the application of big data and artificial intelligence in the kindergarten.

"In our kindergarten, there is a camera on every corner and every child wears their own personal identification bracelet, which has various functions, such as being able to record the child's preferences during the school day, the use of multimedia resources and activity materials and so on." We have also installed smart bookshelves and smart activity cabinets, each with a card reader to record children's use of books and activity materials." All kinds of

materials and tools that children need to carry out various activities, and brush their smart bracelets before taking things out of the shelves. When children need to return activity materials and books, they need to brush their smart bracelets again. In this process, big data and artificial intelligence record the learning and use of children and accurately analyze the characteristics of children's learning and activities, develop a set of teaching programs that meet the personal characteristics of children, so as to carry out targeted and purposeful teaching."

## 5. Strengthen Family and School Collaboration

The use of big data, artificial intelligence and other scientific and technological means can better promote the benign communication between schools and families. As long as parents install the APP developed by the school on their mobile phones, they can have a complete understanding of the learning status of children in kindergartens. The kindergarten will upload the relevant information of each child in the school, such as registration records, learning progress, curriculum content, etc., and will also conduct data analysis of children's learning behavior to help parents better understand the growth state of children. In addition, the APP also launched a consultation on children's growth and education to help parents adopt scientific education methods and better cooperate with kindergartens to carry out family education work. In addition, parents can also search for keywords to obtain certain educational information. The APP can enhance the connection between families and kindergartens, so that kindergartens can grasp the shortcomings and advantages of family education in real time, and also help parents to put forward opinions on the construction, management and teaching of kindergartens. Apps can be used at any time, any place, any place to communicate, such as online parent-child knowledge competitions and organization of home-school exchanges and cooperation meetings. In this way, a benign and effective two-way interaction is formed [7,8].

A preschool teacher in a kindergarten in Beijing was interviewed: "What are the current applications of big data and artificial intelligence in kindergartens for home-school cooperation?" The teacher gave an example: just after the May Day holiday, he used the school's wisdom blackboard to put the children's May Day holiday lifestyle in front of all children in the class. Some of them include children participating in housework, visiting scenic spots, participating in community practice pictures or videos, etc. And then with everyone to exchange the life of the May Day holiday, arouse a heated discussion. The teacher explained that before the May Day holiday, parents should be able to record their children's academic performance during their absence from kindergarten and share it with other students; At the same time, according to the collected information, the teacher has a deeper understanding of each child and carries out the development of new curriculum. Teachers can also record some pictures and videos of each child's classes and activities in the growth file, so that parents can also know the academic and living conditions of children in real time [9,10].

## 6. Summary

In order to promote the rapid development of preschool education, the preschool education industry needs teachers with high-quality information literacy. Through the analysis and application of big data and artificial intelligence, we can first propose personalized learning programs for children's preschool education, stimulate children's learning interest, improve children's cooperative exploration and interaction ability, and shape children's personality. Third, further strengthen campus management, realize the "humanization" of campus management, and create a safer campus environment. Finally, promote home-school cooperation so that parents can have a deeper understanding of their children and educate their

children in a more scientific way. Therefore, the application of big data and artificial intelligence can promote the overall healthy development of children.

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