Applied & Educational Psychology (2025)
Clausius Scientific Press, Canada

DOI: 10.23977/appep.2025.060224
ISSN 2523-5842 Vol. 6 Num. 2

'Starlight Pilot'-Innovation of Intelligent Education Method Based on Facial Communication to Identify Educational Programs for Autistic Children

Xinru Zhang[1,a,*], Yuyan Yang[1,b], Shangyi Dai[1,c], Hongshuang Qiu[1,d]

[1]Xi'an Polytechnic University, Xi'an, Shaanxi, China
[a]2890475879@qq.com, [b]2775491352@qq.com, [c]1422467743@qq.com, [d]2229384313@qq.com
**Corresponding author*

Keywords: Autism, Facial Communication, Smart Education

Abstract: At present, the number of autistic children is increasing year by year, and the traditional teaching methods are facing severe challenges. Among them, emotional understanding disorder has become the main bottleneck of social development of autistic children. Smart education builds an ecological learning environment with the help of information technology, which brings new opportunities for educational innovation. In this context, this study proposes a smart education method based on facial communication, aiming to innovate the education program for autistic children. The research comprehensively uses the literature research method and the interview method, takes 5 diagnosed autistic children and 5 undiagnosed children as the research objects, and carries out educational practice with the help of intelligent electronic devices. Researchers compared the performance of the two groups of children in a variety of facial expression recognition tests and conducted an in - depth analysis based on the IPO model. The results show that the education method can effectively detect the facial expression recognition ability of autistic children, and after controlling the age and IQ factors, the test scores of the autistic children group and the control group are significantly different. This shows that the intelligent education method based on facial communication is feasible and effective, and provides a new effective way for the education of autistic children.

1. Introduction

From the 2025 National Two Sessions, China has over 13 million autistic people (growing 200K yearly, 1/3 children). This disorder brings social, interest, and behavioral problems, hurting kids' growth and social skills[1,2]. At present, many educational methods for children with autism in China focus on caring for and caring for patients, while the emotional understanding ability of children with autism has not received much attention. Therefore, solving their emotional understanding ability is one of the key outlets for many educational methods. From the perspective of intelligent education, the most commonly used intelligent carrier for emotional understanding intervention of autistic children is computer[3].Combining computers with artificial intelligence facial emotion

recognition technology can create an emotional understanding and expression platform for autistic children. By expressing their own facial emotions, these children can practice social emotional understanding. Therefore, this paper conducts educational research on autistic children using the intelligent education method of facial communication.

At present, there are some studies on the emotional understanding of autistic children at home and abroad. Hu Xiaoyi[4] reviewed the round teaching method, including the five core steps of instruction, response, assistance, reinforcement and pause to intervene in autistic children. Huo Wenyao used the intervention method of self-made teaching aids combined with round teaching to conduct an empirical intervention on three autistic children. The results showed that the intervention could effectively improve their facial expression recognition ability and promote the development of other social dimensions[5].Liu Huiping used the method of silent emotional dynamic pictures and emotional name matching to train autistic children[6].This study used visual communication to match pictures with pictures, and achieved good experimental results. Foreign scholars are also using a variety of computer-aided software to educate children with autism, such as the Frankfurt Test and Training of Facial Affect Recognition (FEFA)[7], DVD-Transporter[8], Mind Reading (MR)[9] and so on.

Many methods for autistic children have been studied based on facial communication, but previous research lacked artificial intelligence (AI). AI can monitor and analyze autistic children's facial expressions in real-time. Thus, this paper proposes a wisdom education method combining facial communication with AI. It conducts innovative educational practices for autistic children using literature research, interviews, and this new wisdom education method.

2. Research Methods and Design

2.1. Practice and significance of literature research method

The literature research method, used across multiple scientific fields, gathers, arranges, and analyzes materials. By searching keywords like "autism", "facial communication", and "wisdom education" on CNKI, 103 articles (77 domestic and 26 foreign, from various sources) were sorted. Focusing on autistic children's facial expression recognition, this research explores their facial expression communication issues, laying a theoretical groundwork for the study and supporting the interpretation of intervention results. A literature summary table follows[10]. The Literature research summary table is shown in Table 1.

Table 1: Literature research summary table

Time	Investigator	Research method	Research object
2020	Yin Shuainan	Real human faces	Primary school children with autism
2021	Garcia-Garcia Jose Maria	The method of playing games	Primary school children with autism
2022	Zhang Liangyue	The method of playing games	Autistic patients aged 9-27 years
2024	Liu Shuo	Expression template making and comparison	Autistic patients aged 6-9 years
2025	Cao Bolin	Robot dialogue	30 young people

Using the literature research method, we analyzed many domestic and foreign studies to understand the development features and differences of autistic children compared to typical children. Research shows autistic children have problems in emotional expression like facial expressions and body language, and also struggle to express and recognize emotions[11-14]. These

findings help improve the theory of autistic children's development, which in turn allows us to better refine and innovate the facial-communication-based intelligent education program for them[15,16].

2.2. The practice and significance of interview method

An interview is for research. In this study, oral dialogue gets first-hand info. Unstructured interviews during intervention learn about subjects. Post-intervention interviews based on an outline gather opinions on the intervention and explore students' facial expression recognition results[17,18]. In this interview, five children diagnosed with autism in X city were selected for in-depth practice test. A, B, C, D and E were selected to replace the name of the research object to retain privacy. Three male autistic children and two female autistic children were selected for test, aged 6-9 years old. The Research object selectionr is shown in Table 2.

Table 2: Research object selection

Numbering	Sexuality	Age	Is autism diagnosed
A	Male	6.5 years old	Yes
B	Male	8.1 years old	Yes
C	Female	6.6 years old	Yes
D	Male	7.8 years old	Yes
E	Female	9.3 years old	Yes

This study diversified the interviewees, including teachers, parents, and autistic children to obtain comprehensive and representative information for multi-perspective analysis. The interview questions were carefully designed to focus on autistic children's educational needs, explore their learning challenges, expected support, parent-child and social interactions, and their unique experiences and emotional changes. During the interviews, a reflection and feedback mechanism was applied. Interview strategies and questions were adjusted based on each situation to ensure the study's objectives were met and the data was authentic and valid.

2.3. Wisdom education method based on facial communication

The intelligent education method based on facial communication is a new educational program for children with autism proposed in this paper, which is used to detect the degree of autism and propose educational programs. This method was tested on five autistic children diagnosed in X city mentioned above, and five undiagnosed children F, G, H, I and J in X city were added as control groups. Selection of control group is shown in Table 3.

Table 3: Selection of control group

Numbering	Sexuality	Age	Is autism diagnosed
F	Male	5.9 years old	No
G	Male	7.8 years old	No
H	Female	8.8 years old	No
I	Male	7.4 years old	No
J	Female	9.2 years old	No

In order to ensure the feasibility of this method, the age and IQ of the two groups of children were tested by independent sample t test[19].

As shown in Table 4 and Table 5, with t values ranging from -2.306 to 2.306, there was no significant difference between the means of the two data groups, indicating comparability.

Table 4: Independent sample age t test

Categories of children	Average age	Standard deviation	Critical value	t ratio
Children with Autism Group	7.66	1.04	(-2.306, +2.306)	-0.23
control group	7.82	1.16		

Table 5: Independent sample intelligence quotient t test

Categories of children	Average age	Standard deviation	Critical value	t ratio
Children with Autism Group	91.36	7.714	(-2.306, +2.306)	0.867
control group	94.84	4.616		

The intelligent education method for facial communication uses smart devices like tablets and phones. It tests autistic children through pictures, videos, and acting, then scores their facial communication. During the experiment, there are four test methods, each with distinct scenarios. Researchers give practice instructions and rate the subjects' performance. Below is a rating test of facial communication using this method. The practical content of intelligent education method based on facial communication is shown in Table 6.

Table 6: The practical content of intelligent education method based on facial communication

Testing method	Average age	Standard deviation
Dynamic picture expression recognition	Before showing the dynamic facial expression pictures, the researchers told the students, "Look at this picture. Pay attention to the person's state and tell me what you observe later." After the pictures were shown, they asked, "So, what do you think of the characters' states?"	1. Exactly right (76-100 points): Precisely identify emotions and describe them accurately. 2. Basically correct (51-75 points): Be able to judge the main emotions, but the description is less accurate. 3. Partially correct (26-50 points): Only grasp some emotional characteristics, leading to a biased judgment. 4. Completely wrong (0-25 points): The emotional judgment has nothing to do with the pictures.
Video plot play recognition	Before playing the video of classroom situations, the researcher told the students, "I have a video for you. After watching, tell me the emotion of the person in it." The video was paused when a "happy" facial expression appeared.	
Facial expression imitation judgment	Before playing the classroom situation video, the researcher said to the students, “I have a video. Watch it carefully and imitate the characters' expressions. When the ‘happy’ expression appears and the video pauses, show the ‘happy’ expression you imitated. Let's see who does it best. Now, start watching!”	
The observation method of sitcom acting	Classmates, here’s a classroom-situation video. Watch closely. When the "happy" expression appears and the video pauses, we'll start a fun task. Work in groups to create a short sitcom based on the character's happy state. Act, speak, and express like that person. Add some reasonable plots. Let's watch and get ready for the show!	

3. Calculation results and analysis

3.1. IPO model

This paper uses the IPO model for autistic children's individualized education. It analyzes the educational process to optimize teaching. The input stage considers age, gender, and environment. The process stage focuses on methods, interactions, and evaluation with a facial-communication-based approach. The output stage evaluates teaching effects to monitor development and provide feedback. The IPO model shows its value and supports future innovation in personalized education. The "input-process-output" model is shown in Figure 1.

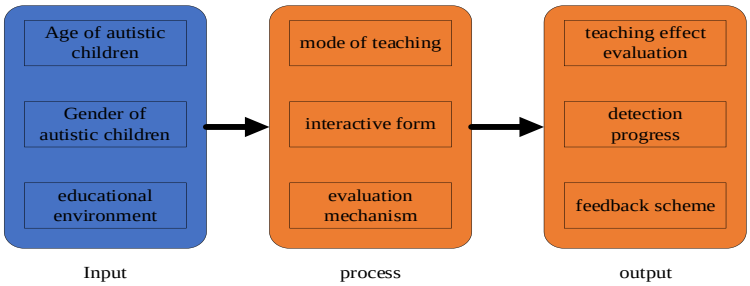

Figure 1: "input-process-output" model

3.2. Example results

Combined with the IPO model, this paper summarizes the scores of 5 autistic children and 5 healthy children who have been diagnosed in X city as the control group. The results of the example show is shown in Figure 2.

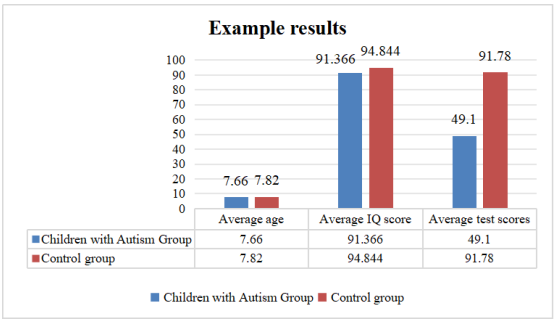

Figure 2: The results of the example show

3.3. Analysis of effect

The figure shows that, with average age and IQ controlled, there is a significant score gap in the facial-communication-based intelligent education method between autistic children and the control group. The average scores of the two groups are 49.1 and 91.78 respectively, proving the method's effectiveness.

Based on an analysis of autistic children's individual differences and cognitive models, the study set a five-week practice period, with 20-25-minute facial expression recognition teaching sessions for each child. This is an innovative and successful educational case, and the intervention duration suits the subjects.

4. Conclusion

This study explores the education of autistic children using the intelligent facial-communication-based education method, yielding valuable results. Through a review of 103 domestic and foreign literatures, it analyzed the emotional expression patterns of autistic children, while interviews with 5 autistic children aged 6-9, along with their teachers and parents, provided multi-perspective first-hand data. An independent sample t-test confirmed the comparability of the autistic children group and the control group in age and IQ, and four test methods including dynamic picture recognition and sitcom acting observation were carried out with intelligent devices. Based on the IPO model, after controlling age and IQ, the significant difference between the average scores of the autistic children group (49.1) and the control group (91.78) proved the method's effectiveness in enhancing autistic children's facial expression recognition, and the five-week practice with 20-25-minute

sessions met their learning needs. This study offers innovative ideas for autistic children's education, and future research could increase the sample size, extend the intervention period, and explore combinations with other educational methods for better results.

References

[1] American Psychiatric Association. Autism spectrum disorder [DB/OL]. 2018-03-16.

[2] Salomone E, Bulgarelli D, Thommen E, et al. Role of age and IQ in emotion understanding inautism spectrum disorder: Implications for educational interventions. European Journal of Special Needs Education, 2018, 34(3): 383-392.

[3] Li Yanwei, Enron, Shao Yuqi, Yuan Zongjin. Emotional understanding intervention for children with autism from the perspective of intelligent education [J].Special Education in China, 2021, (12): 47-53.

[4] Hu Xiaoyi, Cheng Xia. A Review of Concept Teaching Strategies for Autistic Children. Special Education in China, 2019, (1): 25-32,40

[5] Huo Wenyao, Liu Yanhong, Hu Xiaoyi. Intervention study on facial expression recognition in autistic children. Special Education in China, 2016, (7): 52-58

[6] Liu Huiping, Liu Chuanshi. Intervention study of dynamic pictures combined with round teaching on emotional recognition ability of autistic children. China Special Education, 2020, (1): 45-50

[7] Bolte S.The development and evaluation of a computer— based program to test and to teach the recognition of facial affect. International Journal of Circumpolar Health.2002, 61supply 2: 61—68

[8] Golan O, Ashwin E, Granader Y, et al. An intervention using animated vehicles with real emotional faces. Journal of autism and developmental disorders.2009, 40(3): 269 — 279

[9] Golan O, Baron — Cohen S.Systemizing empathy: teaching adults with Asperger Syndrome or high—functioning autism to recognize complex emotions using interactive multimedia. Development and Psychopathology. 2006, 18(2): 591 — 617

[10] Yuan Zhenguo.Education Research Methods [M].Higher Education Press, 2000,149.

[11] Qiu Tianlong, Du Xiaoxin, Zhang Weifeng, Cai Yonggang, Zhang Lei, Zhang Qing. Effect of eye and mouth information weakening on expression recognition of autistic children [J].China Special Education, 2013, (05): 37-41.

[12] Ren Hanlin, Zhang Qing.Neural mechanisms and intervention strategies of eye movement characteristics of face processing disorders in individuals with autism spectrum disorders [J].Campus Psychology, 2020, 18 (04): 338-339.

[13] Ma Bosen, Li Farui, Zeng Xiaorong.A review of gaze research from the perspective of multimodal interaction-a new turn in autism research [J].Journal of Lanzhou University (Social Sciences Edition), 2022,50 (02): 112-121.

[14] Li Hui, Shao Weiting, Xu Sheng.Research Review on Situational Emotion Understanding of Autistic Children [J].Modern Special Education, 2020, (02): 68-74.

[15] Wu Yangfei, Gao Honghe.Research on toy design based on expression cognition of autistic children [J].Design, 2021,34 (09): 11-13.

[16] Liu Shuo.Characteristics and psychological mechanism of abnormal expression imitation in autistic children [D].East China Normal University, 2024.

[17] Cao Bolin, Zhi Bingjie. Young users ' technical expectations and relationship imagination of companion chatbots-a micro perspective based on design interview method [J].Journal of Changsha University, 2025, 39 (01): 41-49.

[18] Tang Yi, Shen Ziqiang, Yan Junfeng, et al. Construction of a digital identification framework of TCM emotions based on facial expression recognition technology [J]. China Journal of TCM Information, 2025, 32 (06): 18-23.

[19] Sun Bingxi, Cai Zhaona, Li Xue, etc. Effect of digital cognitive intervention on cognitive ability of children with autism spectrum disorder [J].Chinese Journal of Hearing and Language Rehabilitation Sciences, 2024,22 (05): 550-554.