

# Application of Artificial Intelligence in Mental Health Education in Primary and Middle Schools

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**Abstract:** The sudden increase in the psychological needs of students, the need to improve the screening rate of psychological problems, the fact that students are guarded, and lack of initiative have highlighted the challenges of school mental health services. China's artificial intelligence psychology and behavior research continues to deepen, combined with new technologies such as biosensing, blood spectrum optical imaging, and psychological counseling big data, in order to fit the characteristics of contemporary students, based on the human-computer interaction mode of objective algorithms, and regulate emotions through real-time physiological monitoring. Various paths such as status and changing cognitive models can be widely used in mental health screening and psychological counseling services in primary and secondary schools, or will become innovative points in the construction of mental health in smart campuses.

## 1 INTRODUCTION

Bioinformatics is a new subject, it is the application of computer and information. Technology collects, stores, analyzes, organizes and manages various biomedical information and a science of utilization. Artificial intelligence is an important direction for the development of medical bioinformatics. Apply the computer to simulate the basic biological mechanism, establish the analysis system of the complex life system and the computer virtual laboratory, develop the virtual experiment from the repeated cycle of "hypothesis-prediction-test-conclusion", construct the virtual experiment in the environment of computer and information science. Electronic cells and organs. Such electronic cells and organs not only include the process of a single cell and tissue work, but also describe the whole picture of the entire cell and tissue work from a holistic perspective, becoming a toolkit and analysis platform for biomedical research. Through this computer platform of electronic cells, as long as we input certain signals and stimuli, electronic cells can reflect the changes and reactions of cells in different times, different spaces, and different substances through pictures and

numbers. As long as we tap the signal of the electronic cell with the mouse, we can realize and simulate the operation of gene knockout, gene transfer, gene modification, prediction and display of experimental results that are difficult to complete in the molecular biology laboratory. It enables people to see the impact of certain factors and links on cells, the whole and life activities in real time. Therefore, it will become a very simple and economical tool for studying gene function and screening drugs, as well as a guide for disease detection, diagnosis and treatment (Shang, Zhang, Lu 2001).

Psychology is closely related to artificial intelligence. Since the concept of artificial intelligence was proposed in 1956, psychologists and artificial intelligence researchers have conducted a lot of collaborative research. For example, in May 2018, the British journal Nature published a research result jointly completed by neuroscientists at the University of London and artificial intelligence researchers from the DeepMind team in the UK. They used deep learning technology to successfully simulate the spatial navigation capabilities of the human brain. This kind of research shows people the application prospects of artificial intelligence technology in

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psychology research (Huang, Huang 2018).

With the steady advancement of my country's education modernization and the continuous development of artificial intelligence (AI) technology, primary and secondary schools in various regions are actively building "smart campuses". In the field of school mental health, some primary and secondary schools in China have taken the lead in introducing artificial intelligence psychological services, using cutting-edge sensor technology, image and language recognition, and big data analysis to quickly discover students' psychological needs and help them actively respond to the current school psychology. Difficulties in health work have become a leader in mental health construction in smart campuses.

## **2 CURRENT CHALLENGES IN MENTAL HEALTH WORK IN PRIMARY AND SECONDARY SCHOOLS**

### **2.1 The Psychological Needs of Students Have Increased Sharply, and the Allocation of Teachers and Professional Abilities Are Relatively Insufficient**

On the one hand, in recent years, student psychological status survey (Li 2019) and hospital diagnosis and treatment data (Xue, Xiao, Fu 2019) show that the number of primary and secondary school students' mental health problems is increasing year by year, and the incidence of learning anxiety and interpersonal disturbances reaches more than 40%; Since the outbreak of the novel coronavirus pneumonia in 2020, the needs of students for psychological care and support have become more prominent. Therefore, the Ministry of Education issued the "Guiding Suggestions for Strengthening Mental Health Education in the New Semester of Primary and Secondary Schools across the Country" (Ministry 2020), emphasizing the psychological well-being of teachers and students. Analyze the health status and formulate a targeted mental health education work plan. On the other hand, judging from the relevant data on the allocation of psychological education teachers in schools, the allocation of psychological teachers in primary and secondary schools in various regions follows the principle of combining full-time and part-time. However, it is

common for part-time psychological teachers to have relatively weak basic knowledge, full-time psychological teachers and those with psychology majors. Background, the proportion of teachers with qualifications of psychological counselors is low, and even many schools are not equipped with corresponding teacher resources (Zhang, Zhang, Yuan 2019). Therefore, it is urgent to resolve the contradiction between the supply and demand of school mental health services.

### **2.2 Psychological Assessment Tools Are Single, and the Accuracy of Psychological Problem Screening Needs to Be Improved**

Domestic school mental health measurement products, such as the most frequently used symptom self-rating scale (SCL-90) and mental health diagnostic test (MHT) are mostly symptom-oriented diagnostic scales, which are more suitable for screening a small number of students with mental illness. Moreover, these scales are mainly designed based on foreign norms and cultural expressions, and it is difficult to comprehensively reflect the actual status of domestic primary and secondary school students' mental health, and there is the possibility of ignoring the developmental needs of most mental health students (Wang, Ma 2010). At the same time, regardless of whether the revised scales abroad or the domestic scales are independently developed, they are used to detect the psychological state of students during a certain period of time, and they are susceptible to memory bias and other factors, may exaggerate symptom questions or give false answers (Zhu 2019). Therefore, the current judgment of students' psychological problems mainly combines the subjective experience of the psychological teacher and the data results of the questionnaire, which takes a long time and the accuracy needs to be improved. Some schools may also have insufficient software and hardware configuration for psychological work, and teachers' requirements and standards for psychological tests. Insufficient understanding of the steps, the scientificity, pertinence and objectivity of the school psychological assessment need to be improved.

### 2.3 Some Students Are Very Alert, and It Is Difficult for the School to Find the True and Comprehensive Crux of the Problem

On the one hand, students' self-awareness gradually becomes stronger as they age, and they are very concerned about their "image" in the minds of others. Some students who do not understand psychological counseling and confidentiality agreements are more worried about sharing their distress with psychological teachers. Received negative comments and alienation from teachers and classmates. On the other hand, some teachers do not change their roles in time during the process of psychological counseling for students, or lack professional psychological counseling skills. They directly instill principles that require students to comprehend by themselves, making psychological counseling more like the conversation of authoritative elders. Students lose the right and freedom to explore themselves, examine difficulties, and even feel dull and boring. Relevant data show that only 20% of primary and middle school students seek help from psychological counselors in schools when they encounter psychological dilemmas (Zhao 2020), Even if some students are experiencing strained family relationships, negative interpersonal distress, or pressure beyond their tolerance, they "do not love, dare to come, and don't have to come" in the school psychological counseling room. It is difficult for the school to find the key to the students' psychology in a timely and accurate manner. Factors and precipitating events.

The mental health of primary and secondary school students has always been an issue of great concern to everyone. In terms of school teachers and environmental equipment, every school should have a counselor and a counseling room, but the counseling function is not optimistic, except that mental health promotion is not in place. In addition, even if students have psychological doubts, they do not want to go to the school psychology room for consultation. The main reasons are: ①The students have a poor understanding of psychological counseling and their attitudes are biased; ②I don't want others to know my problems and thoughts, thinking that the school counseling room is not a "safe" place, and their "secrets" are likely to be known by other students; ③ If a student has psychological problems such as depression, in order to protect the privacy of the student, parents are more willing to choose a psychosocial institution for

consultation or treatment, but psychological consultation generally requires an appointment and has a time limit. It is difficult for students to deal with psychological depression in time when they need to be resolved (Zhang, Wang 2021).

## 3 APPLICATION OF ARTIFICIAL INTELLIGENCE IN MENTAL HEALTH WORK IN PRIMARY AND SECONDARY SCHOOLS

The application of artificial intelligence in mental health work in primary and secondary schools provides new ideas and paradigms for breaking through the predicament.

### 3.1 Application Areas of Artificial Intelligence

Artificial intelligence is the research and development of technological science for simulating, extending, and expanding human intelligence (Shi 2018). On the basis of helping people with production and processing, researchers have begun to increase the social nature of artificial intelligence, and services and social robots have become the focus of the application field. The early exploration mainly focused on simple and conventional human-computer interaction such as providing information, educational assistance, and accompanying entertainment. For example, the chat robot Eliza communicates with users through question and answer, but cannot predict and understand human language expression (Maudldin 1994); Since then, robots such as NAO, Rrobotic, and Softbank have been used in institutions and fields such as medical care and special education (Dawej, Sutherland, Barco 2019), For example, by interacting with children high-five, praise to distract attention during vaccination (Berantn 2013), Rehabilitation training for children with autism through course modules (Li 2016) and so on.

In recent years, artificial intelligence has gradually targeted a wider group of people. In primary and secondary schools, social robots can assist children's language learning and guide children's altruistic behavior; Moreover, children will endow robots with anthropomorphic characteristics and treat them as companions with equal rights, which verifies that users can establish positive social relationships and even attachment to artificial intelligence (Graafmmad 2015).

## 3.2 The Application of Artificial Intelligence in School Mental Health Services

In our country, a series of policies such as the "Development Plan for the New Generation of Artificial Intelligence" have elevated the research on the psychology and behavior of artificial intelligence to the height of the national strategy. A large number of research and development work has been carried out and applied in many fields. Taking the AI decompression empowering robot introduced by Suzhou Tianjiabing Experimental Junior Middle School as an example, the research is well-suited by exploring new technical support combined with biosensing, Chinese recognition and transformation, blood spectrum optical imaging, and psychological counseling case big data. Assist schools and psychology teachers to complete key tasks of primary and secondary school mental health, such as monitoring student stress and improving stress resistance, and support the application of artificial intelligence in primary and secondary school psychological services in my country to be at the forefront of innovation.

### 3.2.1 Accurately Detect Students' Physiological Indicators and Stress Levels

The AI decompression empowering robot can be quickly tested for all students in the school. Through the collection of physiological data such as heart rate variability (HRV) and acceleration pulse wave (APG), as well as comparison with the 200,000 Asian norms, the students can be physically and mentally stressed and autonomous. Quantitatively judge the degree of nerve balance, blood vessels and sleep conditions, and provide test results within <3 min; At the same time, combined with regular questionnaire surveys of students and parents, the system collects personalized information of students for the next step of human-computer dialogue consulting services for students in need.

### 3.2.2 Regulate the Emotional State of Students, Soothe Body and Mind in Time

After getting the preliminary test results, students can enter a special password to enter the decompression empowerment warehouse. The design of the decompression empowerment warehouse space is in

line with the principles of psychological counseling, with darker lights and comfortable seats, and single-sided glass to help students gain a sense of security. The AI decompression empowerment robot helps students relax by playing soothing music, guiding and adjusting their breathing; Encouraging speech and anthropomorphic interaction can also be used to strengthen students' emotional feedback, thereby promoting students' emotional expression and emotional control.

### 3.2.3 Change the Cognitive Model, Improve Communication and Anti-stress Ability

The AI decompression empowerment robot can ask appropriate questions based on students' background information and big data analysis, and guide them to explore the reasons for their own psychological confusion. During the consultation process, the AI decompression empowering robot collects student information in real time through multiple systems such as voice, physiology, and facial expressions, adjusts counseling strategies, and combines psychological counseling methods such as "psych drama" and "empty chair" to change the cognitive model of students. For example, when discussing conflicts with parents, the AI decompression empowerment robot will let students try to sit on the "parent's chair" and think about the focus of the argument from the parent's perspective. It can not only help students resolve current family conflicts, but also promote the development of their empathy ability, thereby improving students' stress resistance and interpersonal communication level.

### 3.2.4 Issue a Recommendation Report for Students, Parents and Schools

After the consultation, the AI decompression empowerment robot will conduct consultation feedback in accordance with the principle of confidentiality, including issuing stress and stress resistance reports to students to facilitate their understanding of their own conditions; Suggest reports to parents to guide them how to get along with their children in daily life; Give the school an overall analysis report and help the school establish an electronic file system. In this way, through the construction of a supportive environment such as psychological education, home-school cooperation, and school management, it helps students obtain a system that is more beneficial to their own development, and is more resilient to face the challenges of growth.



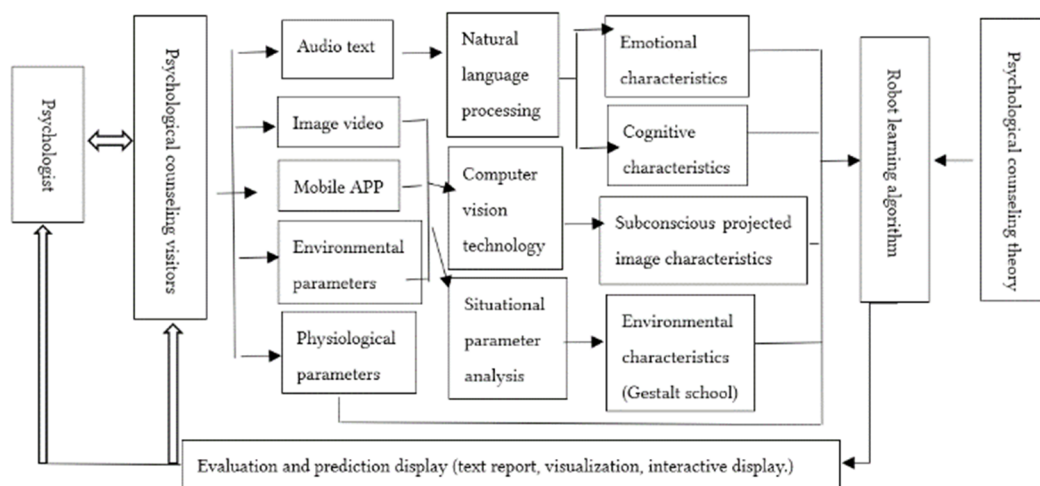


Figure 1: Psychological consultation auxiliary reasoning model for mental health service calculation.

The guiding role of psychological counseling theory in the calculation of mental health services is to establish a psychological counseling auxiliary reasoning model for the calculation of mental health services. As shown in Figure 1. The model reasoning process is as follows: input the visitor's data (language, behavior, parameters, images, videos), use image processing and data analysis techniques to extract features, and then use machine learning algorithms to obtain classification results based on relevant psychological counseling theories; The output is the evaluation and prediction of the internal mental state model of the visitor obtained according to the aforementioned method, and it is presented to the psychologist and the visitor with various display techniques, which then plays a role in assisting the psychological consultation process.

#### 4 ARTIFICIAL INTELLIGENCE PROMOTES INNOVATION IN MENTAL HEALTH SERVICES IN PRIMARY AND SECONDARY SCHOOLS

With the promotion of educational reform and positive psychology, the current mental health services in primary and secondary schools pay more attention to all students and emphasize the promotion of the healthy growth of students' personality and the development of their potential. The exploration of artificial intelligence in school mental health services has broken through the limitations of the traditional model, and may become an innovative point in the

construction of smart campus psychology, and become an important assistant to psychological teachers in primary and secondary schools.

##### 4.1 Support Multi-dimensional Physical and Psychological Monitoring of All Students to Improve Screening Time and Efficiency

Artificial intelligence psychological testing can effectively make up for the shortcomings of the self-rating scale in the current school psychological measurement, and improve the long time-consuming process of calculating the measurement value by the psychological teacher, analyzing the psychological dilemma, and then negotiating with the student for treatment. Utilizing the rapid measurement system and the technical support for hundreds of people to test at the same time, the artificial intelligence psychological service enables the school to systematically organize students to participate in the test, comprehensively and quickly grasp the status of the students, which greatly saves testing time and labor costs. Moreover, the artificial intelligence psychological service can establish student files immediately after psychological consultation, which is convenient for continuous and accurate observation of students' psychological state and the results after consultation. Artificial intelligence has significantly improved the scientificity, professionalism, standardization of software and hardware in psychological work in primary and secondary schools, and the immediacy and accuracy of results, laying a solid foundation for the school's long-term psychological work.

#### 4.2 The Human-Computer Interaction Model Is in Line with Students' Preferences and Encourages Them to Actively Participate in Self-psychological Construction

When artificial intelligence provides psychological counseling services for students, it will explore the problems and specific ways according to the students' personality characteristics and living environment, encourage students to face their own psychological problems and contradictions, communicate and confront each other, and sense their unconscious intuitive thinking. Then through the adjustment on the level of consciousness to achieve a state of physical and mental consistency, in order to inspire students to solve problems on their own, and ultimately achieve the goals of self-improvement, self-acceptance, and self-realization, and obtain the development of a sound personality and the ability to adapt to academics and society. improve. The current artificial intelligence psychological service has also developed mobile phone APP remote chat and intelligent reminder functions, students can communicate anytime and anywhere, share thoughts and worries, and the APP will also send regular greeting messages every day to provide continuous psychological support, which increases the sense of availability and timeliness. Of course, the defined role of artificial intelligence psychological services is a "good assistant", that is, sharing data processing, intervening with mildly ill students, and popularizing psychological knowledge; Psychological teachers are still the executors of school psychological work and are responsible for in-depth intervention and complete tracking of students. Figure 2 shows the appearance of mental health service robot.



Figure 2: Robot outline drawing.

#### 4.3 Neutrality and Privacy Protection based on Objective Algorithms Are Conducive to Discovering More Comprehensive Psychological Factors

In the school mental health service, artificial intelligence is positioned as a friend, communicating with students on an equal footing in the image of listeners and helpers, and students are the leaders of conversations and the main body of seeking solutions. The relaxed atmosphere, private conversation environment and objective and neutral evaluation reduce the resistance of students to self-exposure and emotional expression. The emotional support and positive feedback given by artificial intelligence make students not feel that their self-esteem is threatened, and express their demands and confusion without worry. Relevant studies have confirmed that after being informed that the psychological counselor is an artificial intelligence psychological service system, the individual feels less worried during the consultation process (Zhang, Wang 2021); Moreover, students will share topics such as the troubles caused by the teacher-student relationship in the artificial intelligence psychological service, which is rarely mentioned in the actual communication with the psychological teacher in the school. Therefore, the natural neutrality, empathy and privacy of artificial intelligence psychological counseling can help students express confusion and privacy more fully, help schools find more comprehensive psychological causes, and reduce and avoid possible psychological dilemma factors.

## 5 CONCLUSIONS

With the continuous development of smart terminals and the continuous acceleration of mobile data, artificial intelligence can not only provide a platform for psychological intervention, it is more likely to become the main force of psychological intervention. Scientific research methods separate psychology from philosophy, while artificial intelligence and big data may bring psychology into life more deeply, artificial intelligence can be widely used in mental health screening and psychological counseling services in primary and secondary schools. While fully enjoying the convenience brought by the use of new technologies, it is also necessary to ensure the compliant use of big data, so as to ensure that big data collected from the public will eventually become a weapon rather than a threat to serve the public.

## 6 SHORTCOMINGS AND PROSPECTS

The construction of mental health services in primary and secondary schools is a long-standing and evolving topic. The "intelligent mental service model" formed by organically combining artificial intelligence psychological services with existing mental health education and consultation is the development direction of mental health work in primary and secondary schools. As a cutting-edge technology application, artificial intelligence psychological services still need to further improve the accuracy and comprehensiveness of physical and mental detection, and obtain a wide range of validity verification data support, and design a more convenient application environment for areas and schools with relatively weak psychological service resources to help our country's primary and secondary mental health actions move towards a full, multidimensional, and efficient progress.

In the future, the development of artificial intelligence technology in the field of bioinformatics, in addition to the reasonable analysis and processing of the data of the corresponding biological problems, but also the ability to intelligently integrate the steps of the experimental process. The 21st century is the century of life sciences. With the rapid development of artificial intelligence technology and biological technology, the deep integration of the two is just around the corner!

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