



Research on the Psychology of Art Students in an Intelligent Online Learning System

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Abstract. Although the restrictions of the COVID-19 have been lifted at present, financial instability and the uncertainty of future careers continue to have a sustained impact on the psychological well-being of college students in the post-pandemic era. To promote early anomaly detection and timely guidance for the mental health of art students, this study combines characteristics collection systems and online questionnaires, utilizing the RESE system, to provide effective psychological education strategies tailored to the unique needs of art students. For this purpose, we conducted an experiment with 1673 university students (49.3% male, 50.7% female; 56.7% art students, 43.3% non-art students) participating in an online trial. The experimental results reveal the prevalence of mental health issues among art students and emphasize the importance of capturing subconscious behavior for accurate analysis. The research demonstrates that art students often face underlying mental health problems, making it difficult for them to openly recognize and express their emotions. Through real-time monitoring and objective data analysis, the study successfully identifies varying degrees of anxiety among art students at different academic levels. The RESE system proves invaluable in understanding the performance, attendance, behavioral characteristics, and progress of each art student in isolated learning environments. By promptly detecting mental health issues, this intelligent system enables timely interventions and guidance, benefiting both students and teachers.

Keywords: psychoeducation, characteristics collection, university education, arts majors, e-learning

1 Introduction

Art university students, a niche group often overlooked in education, are more prone to mental health issues. They are generally characterized by emotional sensitivity and individualistic traits, making them difficult for others to understand and empathize with[1]. The lack of professionals who understand both art and psychology in society

and universities has resulted in many psychological issues going undetected and unresolved. Art university students typically express and release their inner emotions through interaction with others and participation in artistic activities, thereby enhancing their psychological resilience and sense of happiness. However, due to the impact of the COVID-19 pandemic, they were unable to engage in these ways or express themselves with others, further exacerbating negative emotions like loneliness, desolation, and anxiety[2]. Personal and societal changes are closely tied to education's role in shaping individuals' physical and mental health, and the COVID-19 environment has presented significant challenges for the education of art university students.

The development of the arts impacts all sectors of society, necessitating in-depth research by educators. It's vital to discover problems with them in a timely manner, in various ways, and to implement sustainable intervention measures. This will assist art university students in developing a positive outlook and better harnessing their artistic potential.

1.1 The Current Situation and Background of Chinese Art Students

Since the COVID-19 pandemic, infectious diseases have spread globally, leading to stringent regulations in many countries. China, for example, implemented lockdown measures and shifted to online teaching for art students. This disrupted their routine and caused psychological challenges. Though control measures have eased, the recovery for both the Chinese economy and the mental well-being of art students will take time.

Chinese university education is unique, with resources concentrated in urban areas, especially for art disciplines. Traveling long distances each semester, most students live in campus dormitories which foster interaction and relieve psychological pressure. However, with the outbreak, recreational facilities shut down, and students had to return home for online learning. Lockdowns were implemented, leaving residents homebound for extended periods.

To ensure continuity in learning during isolation, online classes replaced physical education. However, this shift had psychological impacts. The new teaching method caused discomfort and anxiety as it deviated from traditional approaches. The lack of interaction and limited access to smart devices hindered student engagement and learning efficiency. Financial constraints exacerbated inequality among students.

Although China has lifted isolation measures, schools continue with online teaching to prevent another outbreak. Art students still struggle with psychological issues, such as anxiety and avoidance of social interaction. The prolonged period of isolation has led to significant changes in their daily lives and mental well-being.

Previous research indicates that students suffer mentally after pandemic isolation, with academic delays and lack of socialization being key stressors. Economic instability, especially in the job market, has worsened stress and depressive symptoms. A survey conducted by YoungMind revealed that a large proportion of respondents reported poor mental health during quarantine. While specific statistics

on art students are lacking, we believe they are more susceptible to severe mental issues.

In response, we conducted experiments on 3,000 art college students during and after the isolation measures. The results showed that art students experienced social phobia, anxiety, and avoidance of communication during the pandemic and even after the measures were lifted, indicating that the epidemic's impact continues to persist.

1.2 Exploring Intelligent Measures for the Psychological Issues of Art University Students

Artificial Intelligence (AI) can offer personalized learning experiences and adaptive feedback based on the learning characteristics and psychological states of university students. By analyzing learning data and behavioral patterns of sampled art university students, the system can adjust the content, difficulty, and teaching strategies according to the students' needs and mental state to improve learning outcomes and psychological health.

To better understand and address the psychological issues of art students, our educators have collected data such as attendance rates, assignment submission rates, social media activity, psychological health assessments, and online grades of art students and students from regular majors through extensive online questionnaires and interviews. An AI model is established to predict and identify potential psychological problems, allowing a more accurate understanding of the trends and patterns of psychological issues among art students. During the pandemic, data collection faced serious challenges such as insufficient teaching resources, travel inconveniences, and the specific nature of art majors. Traditional research was difficult to conduct on students scattered across the country, especially in art majors where data samples were fewer, and the particular nature and longer time frames made real-time execution impossible. As a result, many art tutors were unable to timely and effectively identify and guide students through psychological issues.

To mitigate these shortcomings, we adopted an intelligent online learning system. The system collects written or oral expressions from students, as well as various behavioral data, through online questionnaires. The appropriate learning materials are then pushed to students through intelligent recommendation algorithms. By summarizing and analyzing the online learning data of university students, clues to psychological issues such as emotions, anxiety, and stress in student expressions can be identified and understood. Furthermore, to conduct a more in-depth analysis of the psychological impact of the pandemic on university students, we conducted another experiment on these students a year after the end of the pandemic, aiming to better facilitate their reintegration into society.

2 Materials and Methods

2.1 Application of artificial intelligence in psychological education

The field of artificial intelligence is one of the most advanced in the field of computer science. There is a growing interest in applying artificial intelligence technology to the field of college students' mental health education. He Xiaoqing[3] proposed a psychological education strategy based on deep learning to improve the efficiency of psychological education and ideological and political education; Tao[4] proposed a model for predicting the criminal tendency of young people through the use of an ant colony algorithm; Shen[5] combined the Gate Recurrent Unit (GRU) with the attention mechanism to analyze the emotions in ideological and political education and discovered the hidden abnormal psychology present.

This emotion analysis based on artificial intelligence can be utilized in the field of mental health education to identify problems. Behavioral and emotional analysis should be used to determine the abnormalities in students with psychological problems and obstacles, and then psychological counseling should be provided to correct the deviation. Although this is a necessary measure, it is very difficult to provide counseling to those suffering from psychological disorders.

Finding abnormalities through emotional analysis is a method of post-correction. In terms of mental health education, the application of a recommendation algorithm is a method of pre-guidance. In addition to identifying psychological problems and correcting them, it is also important to provide continuous psychological support during the growth process. Similar to physical health, hospital treatment after illness is essential, but the promotion of healthy living habits is equally significant. The purpose of our mental health education based on a recommendation algorithm is to provide continuous psychological services and positive guidance to college students.

2.2 Rongshu E-learning System (RESE)

E-learning has become the best option to prevent the virus spread as it ensures physical distancing, with no close contacts between students and teachers. Moreover, teaching tasks can be completed using information and communication technology, safeguarding the students' learning progress. The online learning mode was proposed merely to resolve issues of isolation. However, during actual teaching work, we found that the mental health of university students was severely impacted due to environmental isolation. With traditional online learning systems, it's challenging to readily comprehend the real-time mental health issues of isolated students scattered across various locations.

Compared to traditional online learning systems, RSES has filled these gaps. RSES is a new online learning system integrating recommendation systems and online questionnaire functionalities into traditional online learning systems. The system includes data collection of students' behavioral features, such as psychological questionnaires, online learning behavior, reading behavior, and browsing behavior. And by means of year-on-year analysis, quarter-on-quarter analysis, and period

comparison analysis, students' individual data is comparatively analyzed. Tutors can more readily identify real-time psychological issues of isolated university students by analyzing this data.

RSES has a wide-ranging learning database, including text, images, audio, and video. In addition to academic materials from various university disciplines, the database also contains literature, movies, news hotspots, and other resources of interest to university students.

RSES is primarily composed of four functional modules: online learning, questionnaire surveys, content characteristics collection, and behavior characteristics collection.

Online Learning

The online learning module is mainly used for real-time video teaching between teachers and students. Additionally, the online learning module also calculates students' attendance, homework submission, and homework grading. Teachers can also participate in e-exams, review test papers, and publish exam results.

Questionnaires

The questionnaire module can be issued by teachers and completed by specific student groups. The questionnaire was revised based on the 'University Student Mental Health Questionnaire'[9] compiled by the Chinese Ministry of Education. We invited multiple educational experts to discuss, analyze, and modify the questionnaire.

Content Characteristics Collection

Content features are mainly divided into user features and course features, as shown in Figure 1:

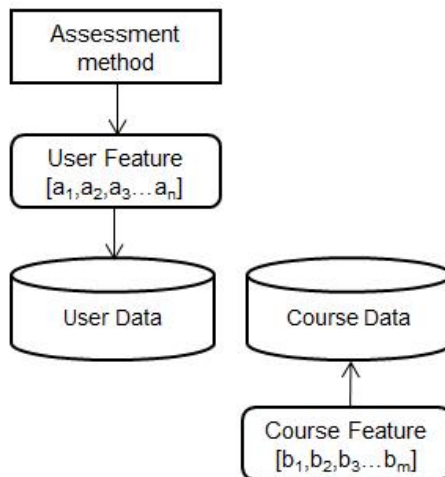


Fig. 1. Content characteristics collection.

In order to avoid the inaccuracy of the recommended ideological and political learning courses due to the lack of relevant characteristic data such as behavior characteristics and scoring attributes when the recommendation system is cold started, we collect the user's interest preferences and the guidance bias characteristics of the course itself as our basic database in advance.

In order to ensure the correctness and effectiveness of the feedback results of the questionnaire, the preparation of the questionnaire is one of the most important links. We refer to many similar learning motivation scales, such as the "learning process questionnaire (SQP)" compiled by Biggs[6] in 1987 and the "College Students' Learning Motivation Questionnaire" in 2005[7]. However, using the general learning motivation questionnaire to investigate the students' learning motivation of Ideological and political education, its pertinence is not strong enough, and we hope to specifically understand the psychological motivation related to the learning content of Ideological and political education. After many studies and investigations, we finally built a brand-new "college study life questionnaire" on the basis of the "College Students' internal study motivation questionnaire of Ideological and political education", combining internal motivation and external motivation, to evaluate and quantify the psychological motivation index of college students for ideological and political education. Then, the user characteristic data of college students are collected through questionnaires, and finally a user characteristic database is formed.

Behavior Characteristics Collection

Behavior characteristics are mainly divided into user behavior characteristics and user evaluation characteristics, as shown in Figure 2:

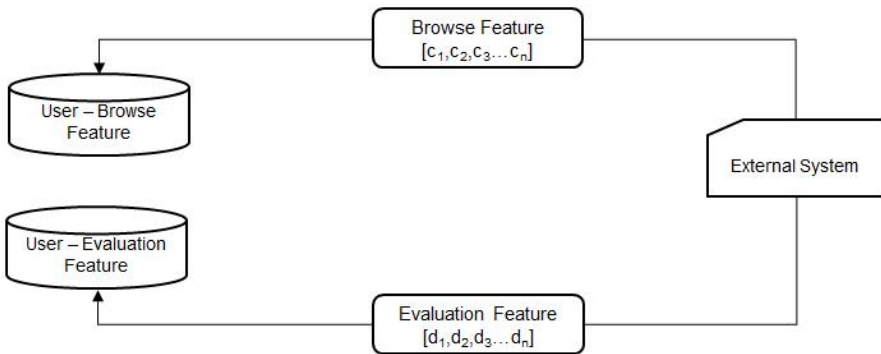


Fig. 2. Behavior characteristics collection.

The user behavior characteristics and user evaluation characteristics are mainly derived from the user's use of the recommendation system, and thus the feedback feature factors. For example, after receiving the final item recommended by the recommendation system according to the content, the user collects the browsing time, post viewing evaluation and other related feature data of the recommended item. This

feature is real-time and effective. Therefore, it solves the migration of interests caused by the changing psychological motivation of users with the social environment, and improves the accuracy of the recommendation system. We collect the user's behavior and evaluation data of the recommended items each time, and finally form the user behavior feature database and user evaluation feature database.

In addition, we also collected the library borrowing records of major universities and college students' web browsing records as the initial user behavior characteristic data, so as to further improve the accuracy of recommendation during cold start.

3 Experiment

We invited 1,673 university students to utilize this system. Of these, 56.7% were art students, and 43.3% were non-art students; males constituted 47.7%, while females represented 52.3%. Low-income students made up 18.7%, high-income students 21.5%, and middle-income students 59.8%. The average age of the participants was approximately 21. Our aim was to understand the factors influencing the mental state of art university students before and during the COVID-19 environment. We collected relevant data during the testing period, such as teacher feedback, browsing records, browsing duration, category of recommended projects, categories of actively viewed projects, online test scores, etc. We've anonymized the data, retaining only non-sensitive information.

The experiment, in accordance with Chinese university semester schedules, was divided into two stages. The first stage was during the COVID-19 quarantine period, from January to June 2022, and the second stage from September 2022 to February 2023, when national strategies were adjusted, and the quarantine concluded. Each stage lasted for six months. We gathered data such as attendance rate, assignment submission rate, survey results, teacher feedback, browsing records, browsing duration, recommended and actively viewed project categories, online test scores, etc.

Through the collected data, we mainly analyzed the impact of gender, family environment, and professional category on the psychology of art students. In addition, employment anxiety during the graduation season has a much greater psychological impact on art students than on non-art students.

3.1 Analysis of Gender Impact on Art Students' Psychology

Data analysis comparing the online recommendation system with traditional art class teaching revealed that male art students had lower assignment submission rate was significantly than that of traditional in-person teaching and considerably lower than that of female art students (Figure 3A). This performance was unusual based on our teaching and research experience. Despite displaying artistic talent in the classroom, some male students failed to submit assignments on time during quarantine. In contrast, female art students had higher assignment submission rates during the COVID-19 quarantine.



Fig. 3. Assignment submission rate of art students during a week in the pandemic (A) and after resuming in-person teaching (B)

To further validate our speculation, we selected a week's assignment submission rate statistics after returning to in-person teaching in December 2022, as shown in Figure 3B. During the second stage, we observed a significant improvement in the male art students' assignment submission rate. In the first stage, their average submission rate was only 66.99%, but in the second stage, it rose to 88.26%, an increase of 21.26%. We identified two main factors contributing to this improvement. First, the lifting of the COVID-19 quarantine allowed male students to interact with their peers, enhancing their learning capacity and creativity. Second, as the quarantine was lifted, male students engaged in interactive leisure activities such as sports, which helped alleviate their mental anxiety.

3.2 Analysis of Psychological Impact on Art Students During Graduation Season

We analyzed the browsing behavior data obtained from the REOLS system, specifically the frequency of visits to employment-related materials within ten days for art students at each grade level, as illustrated in Figure 4A. Surprisingly, we found that the frequency of visiting employment guidance-related information did not significantly increase for art students during their graduation season compared to

students from other grades, as shown in Figure 9. However, when compared to non-art students, the frequency of art students visiting employment guidance-related information during their graduation season was significantly lower, as depicted in Figure 4B. This unexpected finding suggests that, unlike non-art major students, art major students approach employment pressure with a more calm mentality.

According to behavioral psychology, graduation is crucial for Chinese students as it involves significant role transitions and life choices, alongside graduation defenses and employment concerns. The pandemic-induced isolation has added to their psychological burden. Art major students exhibit different behaviors compared to non-art majors. While they perceive higher anxiety levels, their mindset towards job searches appears more peaceful, with anxiety levels not significantly higher than other students.

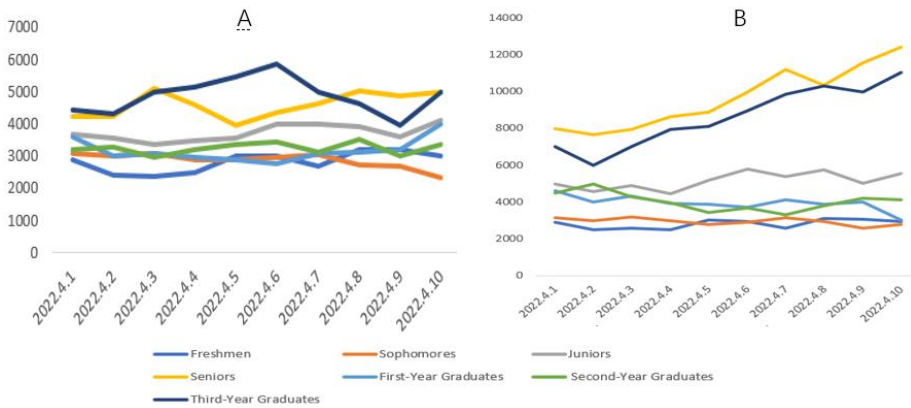


Fig. 4. Frequency of obtaining employment-related information by art major students (A) and non-art major students (B) across all grades

According to behavioral psychology, graduation is crucial for Chinese students as it involves significant role transitions and life choices, alongside employment concerns. The pandemic-induced isolation has added to their psychological burden. Art major students exhibit different behaviors compared to non-art majors. While they perceive higher anxiety levels, their mindset towards job searches appears more peaceful, with anxiety levels not significantly higher than other students.

A comprehensive analysis shows that art students in their graduation season perceive higher psychological anxiety but obtain less employment-related information compared to non-art major students. Graduation season seems to have a lesser impact on the mindset of art students, as they are less eager to find a job. This can be attributed to different motivations for selecting a major and the diversity of career paths.

Firstly, art majors have lower admission scores compared to non-art majors, making it a choice for some students with poor academic performance rather than a genuine passion for art. On the other hand, students with good academic performance choose art majors out of love for creativity and artistic expression. They tend to pursue further studies in the field rather than focusing solely on employment

prospects. Non-art majors prioritize employment prospects and economic returns, leading to different career choices and less employment pressure for art majors.

Secondly, art majors offer diverse career paths in performing arts, design, and creative industries. In the digital age, art students have more opportunities for entrepreneurship and self-employment. This flexibility in career options allows them to explore and choose a suitable path comfortably, alleviating their sense of urgency for immediate employment. Non-art majors face a wider range of career choices, potentially leading to more competition and uncertainty in career development. However, they can leverage social media, online platforms, and independent creation to build personal brands and entrepreneurship projects, increasing their confidence and optimism and reducing employment pressure.

Thirdly, artistic atmosphere and cultural identity: Increased recognition of arts and cultural industries supports art majors, easing job pressures.

Fourthly, higher tolerance for job uncertainty: Art students embrace entrepreneurship, freelancing, and artist identity, while seeking stable job opportunities and careers. Employment matters, requiring support and guidance. Artistic creation promotes creativity and self-expression, impacting mental and physical health. Incorporate art therapy for stress relief and balance. Pursuing personal interests and self-realization increases job satisfaction and positively impacts physical and mental health for art students.

3.3 Analysis of the Psychological Impact of Family Environment on Art Students

In our study, we discovered that family environment significantly impacts the anxiety levels of art students. Considering the city categorization, we observed that students from first-tier cities experience the least psychological pressure, those from second-tier cities face moderate pressure, while students from third-tier cities experience the highest psychological pressure.

Firstly, family cognition plays a role. During the pandemic lockdown, university students were required to return home for online learning. The differences in information are influenced by parental cognition. Students from first-tier cities have parents with higher cognitive abilities who respect their children's independent choices and provide support to alleviate their pressures.

Secondly, family income is influential. Students from first-tier cities usually come from financially stable families, particularly art students who often come from wealthier backgrounds that can support their pursuit of hobbies and talents without early pressure to support the family. Affluent families have generally been less affected by the pandemic compared to lower-income families. In contrast, students from second- and third-tier cities, especially those from impoverished families, face economic pressures to support their families.

Thirdly, the distribution of social resources plays a role. First-tier cities have a well-developed education system with high-quality resources, including prestigious universities, research institutions, libraries, laboratories, and cultural facilities. These resources offer more learning opportunities and support for students during the

pandemic, aiding their independent learning and professional growth. Second-tier cities have fewer educational resources compared to first-tier cities, while third-tier cities, with the weakest infrastructure development, have limited access to high-quality educational resources during the pandemic.

After the quarantine ended, we conducted interviews with students from different cities. From these interviews, we found that job pressure and anxiety persist in small cities. Students agreed with our analysis and highlighted another factor - the cultural atmosphere of the city. In first-tier cities, there is a larger social circle and more tolerance for different career choices. However, second- and third-tier cities have a less diverse cultural atmosphere. Prolonged isolation within familiar social circles during the lockdown, coupled with "familial obligation" and "moral obligation," places additional psychological pressure on university students. This burden continues even after the quarantine ends.

4 Discussion

Through the trial of the RESE system, we discovered that mental health issues among art students greatly exceed expectations. These issues often remain hidden due to students' limited self-awareness. Thus, capturing and analyzing their subconscious behavior is essential for obtaining accurate results.

Many scholars use surveys to analyze the mental impact on college students[8]. Some scholars[9] use AI to study students' mental health, academic performance, and other behaviors, and analyze their browsing behaviors, reading features, and hobbies. However, few scholars allow students to discover themselves through various art forms, express emotions, carry out psychological counseling from art students' self-reflective assignments, and interaction from blended online and offline instruction.

Our hypotheses were confirmed through data analysis. An online survey revealed that art students experience varying levels of anxiety across all grades. Additionally, utilizing the RESE system for behavioral data analysis, we found that art students specifically worry about job-related matters during graduation season. Compared to students from other majors and grades, art students exhibit a higher level of tranquility during this period, presenting an effective strategy for integrating art into psychological education.

Art students tend to be introverted and sensitive, often displaying minimal external emotional expression. The RESE system provides an objective and effective means to analyze the mental health issues of art students. In isolated learning environments, the RESE system enables remote, real-time understanding of each art student's performance, attendance, behavior traits, and progress. This facilitates the prompt identification of mental health concerns among art students, allowing for timely interventions and guidance, thereby greatly benefiting teachers.

4.1 Theoretical Contribution

The study makes three main theoretical contributions. Firstly, it introduces recommendation systems to educational psychology for art majors. While previous research focused on AI-driven personalized learning content, few explored using recommendation systems to identify mental health issues. This study expands the application of recommendation systems in education. Secondly, by integrating online questionnaires with the recommendation system, a more effective psychological education strategy for art majors is proposed to address the cold start problem. This enhances personalized guidance for art students. Lastly, the experiment reveals that art students show a more positive mindset during graduation season compared to students in other majors, suggesting the potential for using art instruction in psychological counseling to help students manage pressure and anxiety.

4.2 Practical Contribution

The study provides practical insights by analyzing the impact of pandemic-induced isolation on mental health among college students. Findings show that art college students face higher levels of depression and anxiety compared to humanities and science students. Behavior monitoring reveals three key student groups prone to mental health issues: art students in graduation season, students from second and third-tier cities, and students from low-income families. Remote psychological education for art majors is challenging, but with the help of the RESE system, teachers can efficiently identify and support students' mental health needs. By leveraging independent student behaviors, precise psychological education can be provided, promoting well-being and academic development in a remote learning setting.

4.3 Future Directions and Prospects

To ensure the sustainability and accuracy of the RESE system and verify the effectiveness of our new teaching methods, we will invite more isolated students to participate in the experiment in our next study. In addition, we will discuss with professional psychology teachers whether the behavioral characteristics reflected in RESE can accurately provide psychological issues.

Furthermore, our research focus will shift from "identifying psychological issues" to "intervening in psychological issues". During this research process, while we retrieved literature about the psychological impacts of COVID-19 on art students and the feasibility of the recommendation system, we also found literature on psychological interventions through art therapy. We believe that the therapeutic effect of painting for psychological healing is commendable. In our next study, we will incorporate online painting psychological therapy into our RESE system to intervene in discovered psychological issues, providing a perfect closed-loop for the remote psychological education process."

5 Conclusions

This study reveals that mental health issues are more prevalent among art students than initially anticipated. Due to the nature of their field, art students often have underlying mental health problems that make it difficult for them to fully recognize their issues. Therefore, capturing and analyzing students' subconscious behavior is crucial for obtaining accurate results.

Furthermore, data analysis validates the hypothesis of this study. Through the use of online surveys and behavioral data analysis with the RESE system, it was found that art students experience varying degrees of anxiety across all academic levels. Additionally, art students often possess introverted and sensitive traits that make it challenging for them to openly express their emotions. The utilization of the RESE system provides a more objective and efficient means of analyzing the mental health issues of art students. In isolated learning environments, the RESE system proves to be highly valuable in remotely and real-time understanding the performance, attendance, behavioral characteristics, and progress of each art student. As such, it facilitates the prompt detection of mental health issues and enables timely interventions and guidance, greatly benefiting both students and teachers.

This study combines recommendation systems with online questionnaires to provide a more effective psychological education strategy for art major students. This approach overcomes the cold start problem of recommendation systems in art majors and offers accurate and personalized psychological guidance for art students. In summary, this study reveals the prevalence of mental health issues among art students and emphasizes the importance of capturing subconscious behavior for accurate analysis. The utilization of the RESE system enhances the understanding of mental health issues among art students and enables timely intervention. Incorporating art into psychological education through recommendation systems and online questionnaires proves to be a more effective strategy.

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