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RESEARCH ARTICLE

Anxiety Sentiment Evaluation and Coping Strategies in English Audio-visual Smart Classroom Based on Artificial Intelligence

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ABSTRACT

With the improvement of the world economy and scientific level, information technology has penetrated into every field of people's life. At present, the intensive development strategy of educational modernization creates conditions for intelligent learning, and promotes the in-depth application of artificial intelligence (AI) in education. By using Intellisense technology to analyze method teaching and AI affective computing technology, a classroom model of English audio-visual listening and speaking can be created. At the same time, anxiety is the most common psychological phenomenon in English psychology classes, and it is also the most important negative emotional factor leading to learning disabilities. At present, anxiety in college English audio-visual class is one of the main reasons for students' concern. Therefore, this paper used AI to analyze the anxiety of students in the smart classroom, and then reduced the anxiety of students by improving the smart classroom model. The results showed that students' anxiety in the English audio-visual smart classroom under AI decreased by 11% compared with the traditional classroom, and the students' comprehensive English level increased by 6% compared with the traditional classroom.

INTRODUCTION

In the field of education, the introduction of information technology directly affects the educational model and educational impact. The smart classroom model provides practical tools and behavioral support for traditional education reform, and introduces classroom teaching processes and systems. For students, using the intelligent classroom teaching mode can record their learning process and analyze students' English learning status, thereby reducing students' anxiety and promoting the cultivation of good study skills. In addition, teachers can monitor feedback in real time through AI, which can reduce students' anxiety in learning English and improve students' participation.

Anxiety is a negative emotion that greatly affects physical health and learning. Dewaele J M reported on the relationship between global trait emotional intelligence and its four components. The analysis showed that overall trait mood, well-being, and social competence were significantly and positively correlated with most dependent variables [1]. Dong J visualized potential connections between directly observable and measurable variables that traditional statistical methods may mask by utilizing innovative network analysis methods [2]. Hh A measured the change from pre-treatment to post-treatment in the Hamilton Anxiety Rating Scale structured

interview guidelines using a latent growth curve model with empirical Bayesian estimates [3]. A complementary human imaging study by Marvar P J demonstrated a unique neural target of intranasal oxytocin and compared its efficacy to well-established anti-anxiety treatments [4]. Stella M proposed a semi-supervised machine learning model to extract features of depression, anxiety and stress from written text [5]. Canl D investigated the relationship between individual health anxiety and emotion regulation and some variables during the COVID-19 outbreak in Turkey, which aimed to explore the relationship between emotion regulation and health anxiety [6]. Vanderlind W M believed that abnormal emotional preferences may contribute to anxiety mood disorders, and also emphasized emotional preferences as a new therapeutic target for interventions aimed at improving emotional functioning in people with elevated levels of anxiety [7]. The above studies have all described the harm of anxiety, but they have not been combined with the English wisdom classroom.

AI promotes the implementation and development of smarter classrooms in English. Kong H analyzed the current situation and existing problems of college classrooms, and built an English intelligent classroom based on AI [8]. An B analyzed the asynchronous teaching of CET, which can enable high-quality English teaching before, during and after class. By constructing a hybrid CET model based on TRC, the evaluation of English before, during and after class was realized [9]. Based on interactive teaching and multiple intelligences theory, Yu M conducted research on the construction of English classrooms, so as to optimize the English wisdom classroom [10]. Valente S analyzed how teacher emotional intelligence affects classroom discipline management and the relationship between gender, academic formation, and teacher service time and their emotional intelligence. The results showed that teachers with better ability to deal with emotions demonstrate better discipline management in the classroom [11]. Wang L adopted the research methods of test comparison before and after the composition experiment and semi-open interviews, and carried out an empirical study on the new teaching mode of intelligent composition review and reform system integration represented by partial cover [12]. Bai H proposed that educational data generated through smart classroom IoT devices and 5G networks can lead the 5G era, thereby forming and creating a dynamic English education system with the concept of intelligent collection [13]. Based on the particle swarm optimization neural network algorithm, Zhang J researched and designed the English smart classroom training framework, and proposed a personalized learning path based on the nonlinear increase of inertia weight and the exploration of unknown space with improved binary particle swarm optimization [14]. The above researches all described the application of intelligent English classrooms under AI, but did not analyze and study the anxiety of students.

By using AI to study the anxiety theory of students' English learning in smart classrooms, it can be found that students' anxiety has attracted the attention of teachers. This requires teachers to pay attention to the learning status of students in English classrooms. The reasons for students' classroom anxiety need to be analyzed, and learning strategies should be adjusted appropriately according to the reasons. This can reduce students' anxiety in English class, thereby promoting students' English learning.

ELEMENTS OF SMART CLASSROOM MODEL UNDER AI IN ENGLISH AUDIO-VISUAL TEACHING

(1) Analysis of the current situation of English audio-visual

At present, there are the following three problems in English audio-visual, as shown in Figure 1. First, the educational model is single and fixed. In the limited classroom time, many teachers focus on organizing listening exercises and grammar lessons for students, but ignore the students' learning and comprehensive language development ability, which results in less time for classroom discussions and presentations. A single teaching method leads to boring English audio-visual

classrooms, low student participation, and poor classroom interaction [15]. Second, students are not interested in learning English and their initiative is relatively poor. Students feel that the English audio-visual class is very boring. As the course content becomes more and more difficult and the level of knowledge continues to improve, students gradually lose interest and confidence in learning English. More and more students do not understand the English language accurately in the classroom. Third, the teaching method is simple and the comprehensive ability is weak. In the teaching process, most teachers organize listening exercises without interaction in the classroom, which leads to low learning efficiency and passive learning for students. In addition, students are not good at previewing English audio-visual courses in advance, which results in them not being able to express their opinions in class, and not be able to identify and ask questions. Moreover, students' review after class is only the task of the teacher, and the voice output is only the keywords and grammar of the repeated text, which leads to a lack of English comprehension and communication skills and poor comprehensive language usability.

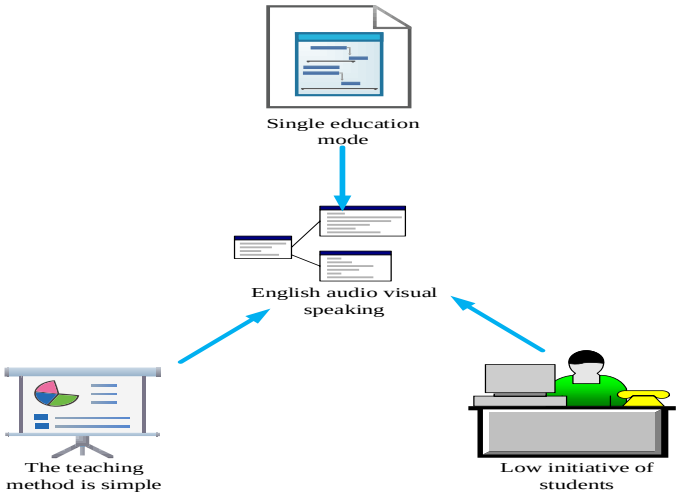

Figure 1. Analysis of the current situation of English audio-visual speaking

(2) Necessity of the smart classroom model under AI in English audio-visual

In the traditional English course teaching, English teaching is hindered by the lack of time, place, equipment and interactive platform, which makes it difficult to achieve its set goals. At the same time, teachers face unfair and objective problems in the selection of teaching content, teaching methods and learning evaluation. Under the influence of AI English teaching methods, smart classrooms pay more attention to cultivating students' autonomous learning ability, so that students can develop good study habits and accumulate more scientific English learning methods [16]. In daily teaching, the mobile intelligent teaching method provides more resources for teaching. It not only improves the teaching input and adapts to the learning environment at the individual level, but also improves the practical efficiency of the English classroom, as shown in Figure 2. The new teaching environment and new teaching goals require continuous improvement and updating of teaching methods and content. Therefore, teachers must use AI to build a smart classroom for English audio-visual and listening to help students improve their interest in English learning, and to get rid of the anxiety caused by English learning.

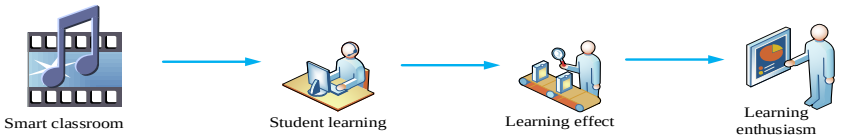

Figure 2. Necessity of intelligent classroom mode in English audio-visual speaking under AI

(3) Feasibility of the smart classroom model under AI in English audio-visual

The introduction of the intelligent classroom teaching mode breaks the boundaries of the traditional classroom teaching system. Students can choose appropriate teaching content according to their own interests and needs, which makes them have a certain degree of autonomy and initiative, and can improve the efficiency of English teaching. The combination of smart classroom and traditional English courses is a supplement to the traditional teaching mode. At the same time, smart classrooms under AI provide students and teachers with practical tools and emotional needs, so that resources and media can be used more effectively. This develops their skills as well as their learning potential, thereby promoting students' active participation in current English learning.

REASONS FOR ANXIETY IN SMART CLASSROOMS

College English teaching is increasingly emphasizing English audio-visual courses. However, students are accustomed to concentrate on listening and speaking, and they are anxious and passive in English audio-visual courses. There are five main reasons for students' anxiety in English classroom, as shown in Figure 3.

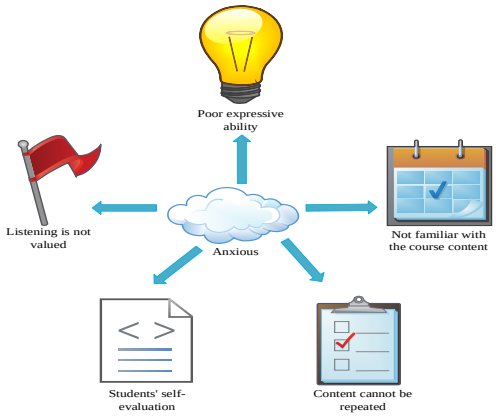

Figure 3. Main causes of students' anxiety in English class

(4) Students' language skills are not good

When using a second language, students are often anxious about making mistakes. Many students still want to take advantage of the limited teaching activities to improve their spoken English, but on the other hand, they also worry about their language proficiency and awkward situations in the classroom. This ambivalence of expression or not makes students feel uncomfortable in the classroom.

(5) Pronunciation is not standard and not taken seriously

Some students don't pay enough attention to their pronunciation, nor do they pay enough attention to their own thoughts and attitudes. Abnormal English pronunciation not only affects students' oral ability and self-confidence, but also affects their communication skills. In addition, abnormal English pronunciation can also seriously affect students' listening level, which causes students with incorrect pronunciation to be unable to understand and accurately answer correct pronunciations and sentences in a timely manner. This reason would also lead to anxiety among students in the audio-visual smart classroom.

(6) Not familiar with the content of English audio-visual writing

Basically students only read on topics of interest to them, leaving students unfamiliar with many other audiovisual issues. At the same time, their knowledge level would directly affect their

perception and understanding of language expression and listening content. If students cannot understand English language content, then they would be more anxious.

(7) English content cannot be repeated

The English Wisdom course is different from the reading and writing process, many of which cannot be repeated often. As a result, many students are afraid of ignoring important material or not being able to deal with the material they receive when they hear an essay or a dialogue, so they feel anxious.

(8) Student self-evaluation

In the English wisdom class, students often underestimate their learning ability and think that their English level cannot be compared with other students, so they are afraid of lectures, group activities and even class speeches [17]. One of the outward signs of this underestimation of one's own abilities is a lack of self-confidence. Generally speaking, the more English courses in the classroom can attract students' interest in learning, the higher the students' self-esteem would be. When students have difficulties in learning English, they should actively overcome the obstacles of language learning, so as to overcome the anxiety caused by the difficulties.

ENGLISH SMART CLASSROOM DESIGN AND ANXIETY COPING STRATEGIES UNDER AI

(1) AI-based smart classroom design for English

The real-time feedback technology developed by AI can dynamically assess the learning process of students in the smart classroom. During the teaching process, teachers send questions on the Internet and set response times. After entering the classroom, students can participate in classroom tests and submit test questions within the specified time, which helps to develop students' sense of time [18]. The application of intelligent teaching system not only ensures the transparency of teaching process and the visibility of teaching results, but also allows teachers to adjust and verify the teaching quality of students. After receiving the students' answers, teachers can understand the students' learning effect. By responding to the analysis results of students' answers in time, it can stimulate students' learning motivation and improve students' anxiety. The classroom design is shown in Figure 4. In addition, in the smart classroom, teachers can effectively adjust their own shortcomings by analyzing the psychology of students, so as to improve the smart classroom curriculum of English audio-visual.

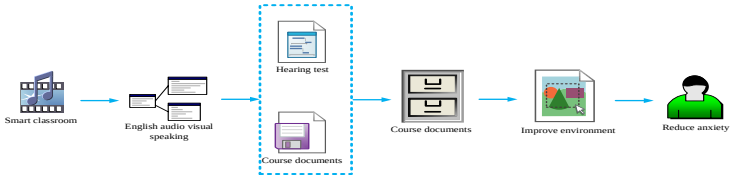

Figure 4. Design of intelligent English class based on AI

(2) Coping strategies for students' anxiety in smart English classrooms under AI

Figure 5 shows the countermeasures for the smart classroom of English audio-visual under AI to help students overcome anxiety. First of all, teachers should continue to encourage students to learn spoken English and provide psychological counseling to reduce students' anxiety and not make them feel ashamed, because various oral mistakes are the only way to improve the oral English of all students [19]. Second, use AI to increase language training activities in smart classrooms, so that students can listen to the voice and read, and they can gradually correct pronunciation errors. Third, students should communicate and learn more about different types of language problems. Questions that are unfamiliar to students should be added to the introduction to basic knowledge, so that students can gradually become familiar with various problems, and it is

also convenient for students to reduce anxiety. In addition, teachers should also pay attention to the quantity and content of English courses. The anxiety caused by the content of the text and the learning effect are closely related to the difficulty of the course. In the classroom, teachers must adjust the teaching pace and weight. In audio-visual classes, teachers can use explanations to express spoken language that students cannot immediately justify. This can avoid students' mechanical expression and prevent students from forming the mentality of repeated sentence listening [20]. For the most difficult passages, students can learn more about it in a lecture session after the practice. At the same time, teachers can provide psychological help to students on a regular basis to develop their basic listening skills.

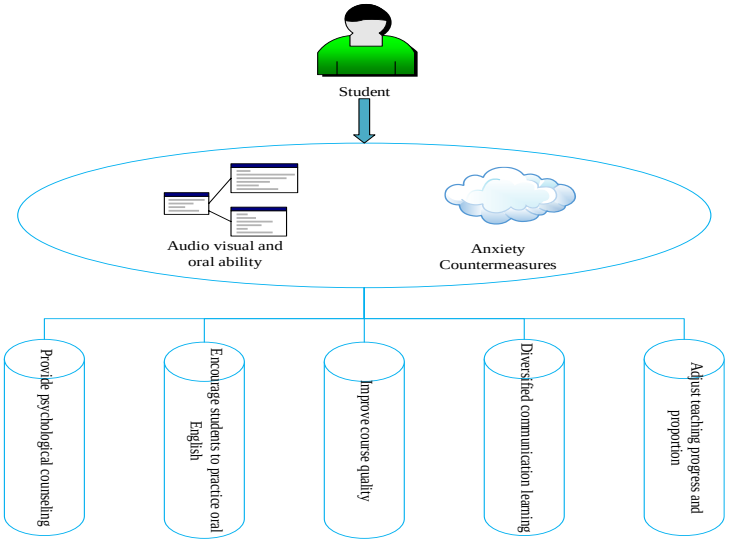

Figure 5. Students' anxiety coping strategies in English intelligence class under AI

APPLICATION OF DEEP BELIEF NETWORK IN THE EVALUATION OF ANXIETY EMOTION IN ENGLISH SMARTER CLASSROOM

In order to understand the emotions of students in smart English classrooms under AI, an analysis and research on anxiety is carried out through deep belief networks. First, the layers of English sentiment are classified. The energy functions of using the model to construct the emotion are:

$$A(x, y; \delta) = \frac{\exp(-B(x, y; \delta))}{c} \quad (1)$$

$$C = \sum_x \sum_y \exp(-B^C(x, y; \delta)) \quad (2)$$

$$A(x; \delta) = \frac{\sum_y \exp(-B(x, y; \delta))}{c} \quad (3)$$

Among them, x and y are the manifest and hidden elements of emotion, respectively, and δ is the model parameter; $A(x, y; \delta)$ is the joint distribution of emotion, and $B(x, y; \delta)$ is the energy function of emotion. C is a normal factor, and the hidden layer also conforms to the Bernoulli distribution. The energy function can be converted to:

$$B(x,y;\delta)=-\sum_{i=1}^{m}\sum_{j=1}^{n}\alpha_{ij}x_i y_j-\frac{1}{2}\sum_{i=1}^{m}(x_i-z_i)^2-\sum_{j=1}^{n}t_j y_j \quad (4)$$

Among them, α_{ij} is the force between the apparent element and the hidden element; m and n are the numbers of the apparent layer and the hidden layer, then the conditional probabilities of anxiety can be obtained as:

$$A(y_j=1|x;\delta)=\varepsilon\left(\sum_{i=1}^{m}\alpha_{ij}x_i+t_j\right) \quad (5)$$

$$A(x_j=1|y;\delta)=\lambda\left(\sum_{j=1}^{n}\alpha_{ij}y_i+z_i\right) \quad (6)$$

According to the Gaussian distribution, the weight α of anxiety is updated, and it can be obtained:

$$\Delta\alpha_{ij}=B_2(x_i y_j)-B_1(x_i y_j) \quad (7)$$

The emotional data samples of smart classroom students are set as:

$$(p_1,q_1),(p_2,q_2),\cdots,(p_i,q_j),p\in R^n,q\in\{1,-1\} \quad (8)$$

Among them, p and q are the input vector and sample feature of emotion, respectively. By dividing the samples into a plane, the relationship between the weight vector and the threshold can be obtained as:

$$\begin{cases}\mu^T p_i+z<0,q_i=-1\\ \mu^T p_i+z>0,q_i=1\end{cases} \quad (9)$$

By using geometric knowledge, the optimal distance between emotion samples can be obtained as:

$$v=\frac{\mu_0^T p+z_0}{\|\mu_0\|} \quad (10)$$

The influencing factor function of student anxiety found by the coefficient method is:

$$W(\mu,z,t)=\frac{1}{2}\mu^T\mu-\sum_{i=1}^{m}t_i\left[q_i(\mu^T p_i+z)-1+\varepsilon_i\right] \quad (11)$$

After derivation of the influencing factor function, it can be got:

$$\mu=\sum_{i=1}^{m}t_i q_i p_i,\sum_{i=1}^{m}t_i q_i=0 \quad (12)$$

The nonlinear emotional duality problem is obtained as:

$$S(t)=-\frac{1}{2}\sum_{i=1}^{m}t_i t_j q_i q_j p_i^T p_j+\sum_{i=1}^{m}t_i \quad (13)$$

The optimal condition introduced is:

$$t_i\left[\left(\mu^T p_i + z\right)q_i - 1 + \varepsilon_i\right] = 0 \quad (14)$$

Finally, the optimal solution and optimal judgment of anxiety can be obtained as:

$$f(p) = \operatorname{sgn}\left[\sum_{i=1}^{m} t_i q_i (p_i)^T p + z_0\right], z_0 = 1 - \mu_0^T p_s \quad (15)$$

EXPERIMENT ON ANXIETY IN ENGLISH AUDIO-VISUAL INTELLIGENT CLASSROOM UNDER AI

In order to further understand the anxiety of the students in the English smart classroom, the anxiety of the students was analyzed under the AI. This paper selected the satisfaction level of students and teachers in a school with smarter classrooms, as shown in Table 1.

Table 1. students' satisfaction with smart classroom

	Satisfied	Commonly	Dissatisfied
Student	82	11	7
Teacher	82	13	5
Total	164	24	12

It can be seen from the table that both students and teachers were very satisfied with the English audio-visual smart classroom. For satisfied students, smarter classroom can make full use of the advantages of advanced equipment to increase the interest of English audio-visual class, and smarter classroom can also train English speaking and writing ability more conveniently. For teachers who were satisfied, smart classroom can free their hands. It not only can make the English audio-visual classroom more colorful, but also can use the smart classroom to improve the teaching efficiency.

(1) Students' initiative and speaking level of English audio-visual smart classroom under AI

In order to understand the anxiety of the students in the smart classroom of English audio-visual, this paper analyzed the students' initiative and speaking level in the smart classroom. The results are shown in Figure 6.

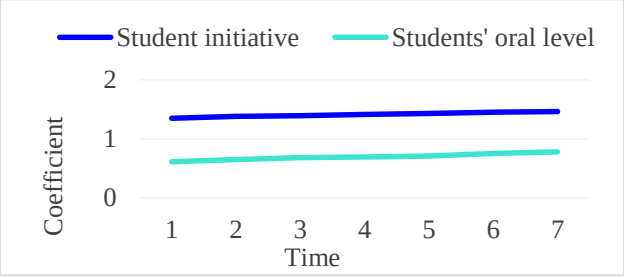

Figure 6. Initiative and oral level of students in English audio-visual and oral intelligence class under AI

It can be seen from Figure 6 that with the increase of smart classroom time, students' initiative and oral English level were constantly improving. The average student initiative was about 1.41, and the seventh day increased by 0.11 compared with the first day; the average student's speaking level was about 0.70, and the seventh day increased by 0.17 compared with the first day. All these showed that the audio-visual smart classroom in the English classroom can promote the diversified development of English courses under AI, and can help teachers drive students' enthusiasm for learning in the classroom. It can also formulate courses suitable for students' active participation

according to students' learning conditions, thereby improving students' English speaking proficiency and classroom participation.

(2) Optimal distance and optimal solution analysis of deep belief network in smart classroom under AI

In order to understand the students' emotions in smart English classrooms under AI, this paper analyzed the optimal solution and optimal distance of students' anxiety in smart classrooms through deep belief networks. The results are shown in Figure 7.

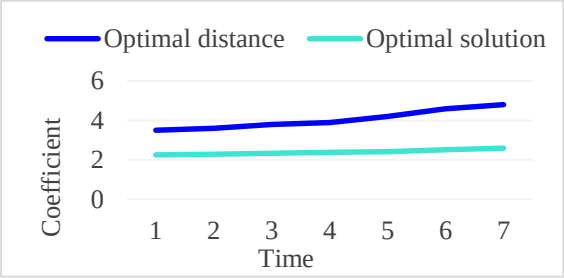

Figure 7. Optimal distance and optimal solution analysis of deep belief network in intelligent classroom under AI

According to Figure 7, as the time of the smart classroom increased, the optimal distance and optimal solution for students' anxiety were increasing. The mean of the optimal distance was about 4.06, and the seventh day was 1.3 more than the first day; the mean of the optimal solution was about 2.40, and the seventh day was about 0.34 more than the first day. All these showed that students' anxiety can be effectively solved by AI in the smart classroom. Moreover, there are more and more optimal solutions, which also showed that there are more and more strategies for solving students' anxiety. At the same time, the students' enthusiasm for learning would also increase.

(3) Anxiety analysis of students in English audio-visual smart classroom under AI

In order to understand the anxiety of students in smart classrooms under AI, this paper compared students' anxiety and comprehensive English level with traditional classrooms. The results are shown in Figure 8.

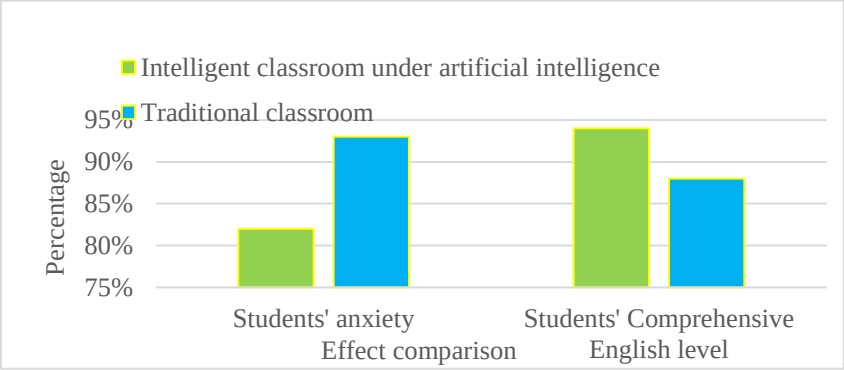

Figure 8. Analysis of anxiety of students in English audio visual speaking intelligence class under AI

It can be seen from Figure 8 that the anxiety of students in the English audio-visual smart classroom under AI dropped by 11% compared with the traditional classroom, and the students' comprehensive English level increased by 6% compared with the traditional classroom. The English audio-visual smart classroom can effectively help students improve their self-confidence and allow students to express themselves in the oral English test. Moreover, it can also use the real-time

feedback ability to detect the learning status of students, which is convenient for teachers to improve the curriculum design in a targeted manner. In this way, it can attract students' participation, reduce students' anxiety, and improve the teaching effect of English smart classroom.

CONCLUSIONS

In smarter classes, when teachers only focus on imparting knowledge without paying attention to students' problems, it often leads to students' anxiety. Qualified teachers not only use their own words and deeds to influence students, but also pay attention to students' emotional barriers. Teachers should relieve students' anxiety, enhance self-confidence, and finally turn stress into strength. This can improve students' autonomous learning ability and create a good humanistic education atmosphere. At the same time, it is necessary to use AI to improve the smart classroom of English audio-visual, so as to reduce the anxiety of students and improve the effect of English learning.

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