Classroom Design and Application of Art Design Education Based on Artificial Intelligence

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ABSTRACT

With the development of society, the education goal of art and design education for students is constantly changing, focusing more on students’ professional and practical abilities, but the traditional teaching methods cannot provide the conditions needed for teaching. In this article, the three parts of art design classroom atmosphere before, during and after class, and according to the characteristics and needs of each part into artificial intelligence technology to build a smart classroom system. The experimental results show that AI technologies can improve the efficiency of classroom management, and the information obtained from the emotional score data can help teachers understand and master the classroom teaching situation, and analyze the shortcomings of classroom teaching content based on the comprehensive classroom emotional score. In addition, AI technology can also enrich classroom content, diversify teaching modes, increase the interaction space between teachers and students and students, and improve the teaching quality of art design classrooms.

KEYWORDS
Artificial Intelligence, Art and Design, Educational Classroom, Technology-Assisted

INTRODUCTION

Artificial intelligence technology not only changes the way people work and live, promotes social development, and fosters the development of innovative technology, but also opens up new areas of development in the field of education and accelerates the process of modern education development. Culture needs heritage, education needs innovation, and the way of education should keep changing according to the needs of the times. Information technology and the coverage of basic campus networks provide sufficient educational resources for educational reform, introduce different and advanced educational theories and technologies, optimize educational management and operation systems, and improve the utilization and intelligence of educational resources. Artificial intelligence technology, on the other hand, provides more technical support and new development goals for the development of intelligent education (Yang & Ren, 2021). Traditional education methods are limited by various objective reasons and technologies, and most of the intelligences present knowledge
contents through linguistic descriptions and two-dimensional images with a single teaching method, uniform management mode, lack of vividness of teaching contents, and education centers ignoring students’ independent initiative (Liu et al., 2019). Educational reform emphasizes that education should be people-oriented, tailored to the needs of the individual, achieve quality education and lifelong education, break the limits of education, advocate for the equity of education, and provide more opportunities for people to access educational resources (Peng et al., 2022). The artificial intelligence technology has enabled a new stage of house development in all aspects of education modes, learning environments, and educational content, and has built a teaching ecological environment that can be symbiotic, shared, and interactive.

The educational goals of art and design education in the information and digital era are also different from those in the past, with more emphasis on cultivating comprehensive qualities of students and presenting comprehensive and diversified educational contents through various educational approaches (Zhufeng & Sitthiworachart, 2021). The integration of artificial intelligence technology and art and design education has changed the teaching mode of art and design education classroom in terms of time, space, and mode, which has opened up students’ career prospectives and broadened their learning space. It is also able to accurately analyze students’ classroom behaviors and learning deficiencies to achieve the purpose of adopting a reasonable and effective approach to cultivate students at different stages of their careers, stepping out of the shackles of traditional education (Tierney, 2006). Art design is the expression of the designer’s thoughts and emotions through the medium and is a refraction of the designer’s spiritual world, focusing more on the interaction and communication between emotions (Jia et al., 2019). The traditional education classroom cannot provide students with sufficient time and space for design, thought, and emotional expression and communication. Artificial intelligence technology can provide students with virtual interactive space, increase the real interaction between students, teachers and students, and improve students’ practical ability (Yunfeng & Jin, 2020).

There are a number of challenges and limitations to the application of AI technology in the field of education. First, there are problems with technical feasibility; AI systems may not be able to fully understand students’ emotions and complex thought processes, leading to misjudgments or inaccurate results. Second, data quality and diversity are crucial for the accuracy and adaptability of AI systems, but obtaining high-quality and diverse data in educational scenarios is challenging. In addition, the use of AI technologies to collect and analyze student data may involve privacy and ethical issues that require keeping students’ personal data safe and complying with relevant regulations and ethical guidelines. At the same time, the use of AI technologies may reduce substantive interactions between students and their teachers and peers, negatively impacting students’ social and emotional development. Finally, the use of AI technologies may change teachers’ roles and career prospects, requiring attention to teacher training and development to adapt to the new teaching and learning environment.

In order to ensure that AI technologies are used effectively in education, we need to think carefully about and address these issues. This includes improving the comprehension and accuracy of AI systems, addressing the challenges of data acquisition and processing, ensuring the privacy and security of student data, balancing technology with traditional teaching methods to promote holistic learning and development, and focusing on teacher training and development to adapt to the new educational environment. By taking these factors into account, we can promote the use of AI technologies in education and provide students with better learning experiences and development opportunities.

Artificial intelligence technology provides technical support for the wisdom of art and design education classrooms, increases the possibility of classroom innovation realization, and makes up for the deficiencies in the traditional art and design classroom. Therefore, this paper integrates deep neural network, machine learning, and Kinect technology of artificial intelligence technology in the design of art and design education classrooms to build a classroom system covering before, during,
and after class to achieve personalized educational resources for students before class, increase interaction during class, and obtain classroom feedback information for teachers after class. It helps teachers to have a more comprehensive grasp of classroom education, make targeted improvements, and provide students with more reasonable and effective classroom teaching content.

In the future, the application of AI in art and design education will take several directions. Creative collaboration will be realized through intelligent collaboration tools and platforms to support real-time collaboration, provide creative inspiration, and enhance teamwork, among other things. Meanwhile, machine learning-based algorithms can be used to generate initial sketches or design concepts for artwork, providing artists and designers with inspiration and creative starting points. In addition, AI systems can provide personalized art and design education based on students’ interests, abilities, and learning styles, customizing the content and learning paths for each student and providing personalized feedback and assessment. Artificial intelligence can also help analyze and understand the connotations and styles of artwork, providing more accurate and in-depth analysis for art history research and art education. Finally, interdisciplinary integration can promote knowledge exchange and cooperation between different fields, providing a broader vision for the application of AI in art and design education. As technology continues to advance and educational needs change, we can expect AI to play a greater role in art and design education and provide students with richer, more personalized learning experiences.

APPLICATION OF ARTIFICIAL INTELLIGENCE TECHNOLOGY IN THE FIELD OF EDUCATION

There is a certain variability in the needs and requirements of society for mass education at different stages of development, and the main problem facing mass education since entering the era of intelligence is how modern technology can achieve wisdom and precision in education, provide educated people with the opportunity to plow through access to educational resources, and achieve educational equality and lifelong education (Tang & Chen, 2020). At the same time, the combination of artificial intelligence technology and education has changed the requirements for student education (Wu & Yang, 2021). The era of intelligence pays more attention to the cultivation of students’ practical and application skills, emphasizes the importance of students’ proficiency in using appropriate technological tools, and pays attention to the cultivation of students’ ability to collect and analyze data and information (Wang, 2021). The changes in educational requirements and goals have also propelled changes in educational teaching concepts and approaches. Some scholars have proposed the concept of smart classrooms based on the flipped classroom education model, combined with information technology to promote the information level of teaching (Ling, 2022). Some scholars also proposed that education evaluation is an important part of the education system, and intelligent education evaluation can not only expand the evaluation content and change the evaluation mode, but also provide a strong basis for decision making for personalized education by analyzing data, mining, and recording educational growth trajectories through technology (Liu & Wang, 2021). In addition, some scholars believe that the application of modern information technology and artificial intelligence technology can clarify and analyze the current situation in which education is located from a global perspective, and mine the information of educational data to obtain more information and correlations of valid values with the landing point of teaching reform committee (You & Liu, 2021).

Educational reform is not only a change in teaching methods, teaching approaches, and the content of education and teaching evaluation, but also a human-centered and student-centered change in the direction of education (Blasch et al., 2021). Some scholars believe that traditional teaching evaluation places more emphasis on student performance and mastery of knowledge in the classroom, largely ignoring the cultivation of students’ values and morals (He, 2022). The intelligent era places more emphasis on the comprehensive quality of individuals, which emphasizes not only the knowledge and skills of students but also the importance of their all-around development (Ning et al., 2022). Some
scholars have combined information technology, artificial intelligence technology, and classroom teaching behavior theory to obtain more information about classroom teaching behavior through relevant technologies and analyze the dynamic performance of teaching, teaching objectives, and teaching environment shown under different teaching concepts (Li, 2021). Classroom teaching is a way of activity in which teachers and students press into teaching goals through interactive communication in classroom scenes, and some scholars point out that the classroom should pay attention to cultivating students’ ability to explore learning independently to improve the teaching efficiency of the classroom (Andrienko et al., 2007). On this basis, some scholars believe that teachers should guide students to make choices and reflections in the process of cultivating students’ independent learning and mutual cooperation and construct a completed information feedback system (TS & Guddeti, 2020). Other scholars believe that a modern, high-efficiency teaching classroom should maximize classroom effectiveness and efficiency as much as possible on the basis of clear teaching objectives (Shibukawa & Taguchi, 2019). The application of artificial intelligence technology, on the other hand, provides holographic analysis for classroom evaluation, interaction, and information feedback, which can provide global observation and analysis of teaching from multiple perspectives and diversity, and also support the intelligent development of different aspects of teaching through technology (Yu et al., 2019). Some scholars argue that the ultimate form of communication in classroom teaching is verbal communication, and artificial intelligence technology can provide statistical and analytical information on verbal communication between teachers and students, provide teachers with information feedback, and then adjust the classroom teaching framework to promote effective communication between teachers and students (Libao et al., 2021). At the same time, AI technology can also recognize human emotions and obtain relevant emotional information through face recognition technology to comprehensively reflect the emotional state of students in the classroom and help teachers grasp students’ classroom performance (Chiu & Chai, 2020). Thus, it can be seen that the application of artificial intelligence technology in the field of education meets the future development needs of education, and the integration of the two can bring more driving force for education reform.

Many e-learning platforms use artificial intelligence technologies to personalize the learning experience. For example, Coursera’s “recommend system” utilizes students’ learning histories and interest preferences to provide them with course recommendations tailored to their needs.

CLASSROOM DESIGN OF ART AND DESIGN EDUCATION BASED ON ARTIFICIAL INTELLIGENCE TECHNOLOGY

Classroom education should conform to the laws of human learning, use a variety of teaching methods to deepen students’ cognition, help them build a scientific knowledge system, and enhance their practical skills (Willingham, 2021). At the same time, the improvement of classroom education does not happen overnight, but requires continuous problem identification and solution in practice, gradually forming classroom teaching contents and teaching modes that are scientifically effective, meet students’ needs, and can achieve teaching goals. The application of artificial intelligence technology in art and design education classrooms can help teachers recommend personalized teaching resources for students, develop learning plans that meet students’ own characteristics and needs, collect and analyze classroom data, and provide teachers with teaching suggestions and decision-making basis (Li & Zhang, 2022). Human-machine interaction increases information interaction between humans and humans and between humans and machines, provides more space for students to explore and create, stimulates students’ motivation for independent learning, extends the effect of classroom teaching, and guides students to think and practice actively after class, as shown in Figure 1.

The model is divided into three modules: before, during, and after class, and the different modules are supported and applied with AI technology to achieve the educational goals that need to be reached at different teaching stages.
Deep Neural Networks in the Art and Design Classroom

Deep neural network can be applied to classroom teaching management to realize intelligent clocking, recognition, and analysis of student behavior. At the same time, it can also collect and analyze data on teachers’ behaviors in the teaching process and back feed the analysis data results to teachers to achieve a closed-loop information of teaching mode.

The realization of intelligent clocking and the recognition and analysis of teachers’ and students’ behaviors is mainly done by face recognition system. The traditional face recognition system is based on the recognition model constructed by neural network, which is easily affected by environmental factors and reduces the accuracy and efficiency of recognition. Deep learning theory comes from the working mechanism principle of the human brain, and deep neural network structure is similar to neural network, but it has more hidden layer networks; each layer completes specific target operation, and after the higher layer continuously abstracts the lower layer to realize the cooperation between layers, it reduces the model error rate and improves the training effect and scale. Convolutional neural network is a multi-layer, forward-depth neural network with convolutional structure, and its effect in image local feature extraction is better than the traditional BP neural network, mainly improved in four aspects. Firstly, convolutional neural network can realize local perceptual field through local connection, and finally obtain global information by synthesizing local information through high level. Second, the convolutional neural network can use the same kind of convolutional kernel to convolve different perceptual fields and share the weights of the massive parameters that still exist after the local connection, significantly reducing the number of training network parameters. Figure 2
shows the comparison between traditional neural networks and deep neural networks in terms of local receptive fields and weight sharing. Third, the convolutional neural network reduces the probability of overfitting problems in network training to a certain extent through the pooling process. Fourth, the multilayer convolutional layers improve the model complex function approximation effect, refine the feature extraction granularity, and obtain global features that are more realistic.

Caffe-face is one of the face recognition network structures, and its advantage is that the joint surveillance network training performance has better cohesiveness and can still show good recognition performance even with a small training data set, which is more suitable for face recognition in the teaching classroom. The joint surveillance network in this network contains two functions; Center Loss, which can expand the distance between classes while shortening the class cohesion, and Softmax Loss, which can effectively separate different classes. The two formulas are shown in (1) and (2), respectively:

\[
l_c = \frac{1}{2} \sum_{a=1}^{A} \left\| m_a - c_a \right\|_2^2
\]  

(1)
The overall loss function is shown in Equation (3):

\[ L = l + \alpha \ell_c = -\sum_{a=1}^{A} \log \frac{e^{u_{a}m_{a} + d_{a}}}{\sum_{b=1}^{B} e^{u_{b}m_{a} + d_{a}}} + \frac{\alpha}{2} \sum_{a=1}^{A} \| m_{a} - c_{a} \|_{2}^{2} \]  

(3)

where the weight of the Center Loss function in the overall loss function is expressed as \( \alpha \).

**Application of Machine Learning in the Art and Design Classroom**

Machine learning can obtain data related to students’ learning process in art and design, mine and analyze the data through corresponding techniques, extract students’ learning regularities and characteristics, determine students’ current learning knowledge status according to the knowledge graph, and assist teachers in constructing personalized and effective learning methods for students.

The machine learning model is implemented based on the Apriori algorithm, which analyzes the data to obtain correlations and potential association rules between samples. The algorithm requires iteration by iteration to first obtain the data samples with high frequency and then use them as the basis for the next data sample. Let the two sample data sets without intersection be \( M, N \), and describe the association rule and strength between them by support and confidence rate, as shown in equations (4) and (5):

\[ S(M, N) = P(M, N) = \frac{\text{num}(mn)}{\text{num}(allsamples)} \]  

(4)

\[ C(MN) = P(m|N) = \frac{P(mn)}{P(n)} \]  

(5)

In the formula, Support rating is expressed as \( S \), Confidence rating is expressed as \( C \), and the whole data set is expressed as \( \text{num} \).

The Apriori algorithm cannot perform violent search by traditional data processing, and requires pruning of classroom teaching data, after which data normalization is performed. The preliminary data categorization results are shown in Equation (6) as follows:

\[ D_{N} = \begin{bmatrix} 
    d(m_{1}, m_{1}) & \cdots & d(m_{1}, m_{N}) \\
    \vdots & \ddots & \vdots \\
    d(m_{N}, m_{1}) & \cdots & d(m_{N}, m_{N}) 
\end{bmatrix} 
\]  

(6)

where the total number of all data is expressed as \( N \), and the average value is obtained according to equation (7):
where the average of all the data is expressed as $\overline{R}$. After obtaining the average value and completing the normalization of the data according to the classification weighting error, if the village needs to carry out additional data, it is necessary to first compare the data of the missing classroom students or teachers with all the remaining data, extract the required key factors, and then make predictions and projections on the obtained samples to obtain the missing data with a basis.

According to the art design classroom teaching objectives, the processed student and teacher classroom teaching effect data information is uploaded to the server, and the data is referred and scheduled through the characteristic vector, as shown in Equations (8)-(10):

$$m^{(h)} = \left[ m_1^{(h)}, m_2^{(h)}, \ldots, m_{N_h}^{(h)} \right]^T$$

$$s^{(h)} = \left[ s_1^{(h)}, s_2^{(h)}, \ldots, s_{N_h}^{(h)} \right]^T$$

$$n^{(h)} = \left[ n_1^{(h)}, n_2^{(h)}, \ldots, n_{N_h}^{(h)} \right]^T$$

where the linear horizontal and vertical inputs to the model are represented by $m^{(h)}$ and $n^{(h)}$, respectively, and the reversible and unchanged output is represented by $n^{(h)}$.

The model predicts the best classroom teaching effect as the time-frequency feature through which the basic characteristics of the art and design classroom are expressed. The entire data set can be considered as $n^{(h)}$ data points in a discrete state, denoted as $Q = \{ q_1, q_2, \ldots, q_N \}$, and the mean values of gain index time and frequency of students in the classroom can be calculated according to Equations (11) and (12) as follows:

$$T_x = \frac{1}{E} \int_{-\infty}^{+\infty} \left| m(T) \right|^2 dT$$

$$V_x = \frac{1}{E} \int |m(V)|^2 dV$$

Application of Kinect Technology in the Art and Design Classroom

Art design classroom teaching needs to pay attention to the combination of theoretical knowledge and practical application and enhance students’ expression and interactive communication ability. Kinect technology can be used as the basis to build a human-computer interactive physical game module to complete art design tasks through the limbs, increase the interactivity between humans
and machines and between everyone, and promote the exchange of ideas and emotional expression. Kinect technology recognizes human posture is based on skeleton characteristics data, and the angle and speed characteristics data of the human body of the recognized object are collected, and the angle characteristics are used as the basis for DTW algorithm matching and finally scoring.

The feature extraction of joint angle is based on 3D coordinates to obtain the spatial information of the human hangers’ joint points, and the spatial angle of the joint nodes is determined by the known spatial angle, and the double angle feature information is usually extracted for eight key skeleton nodes in the human body. Extracting joint motion velocity features requires setting the same interval to obtain the skeleton sequence, and the instantaneous velocity presented by the joint point of the current sequence frame is the difference of the previous frame. Denote the current node as \( j \), which is calculated as shown in Equation (13):

\[
s_j = d(p_j, p_{j-1})
\]

where the spatial coordinates of the current node are described as \( p_j \), its instantaneous velocity is denoted as \( s_j \), and the Euclidean distance between the two vectors is noted as \( d \).

The acquired human action sequence is the set of continuous skeleton data with the same time interval. Let two of the action sequences be denoted as \( H = (H_1, H_2, \ldots, H_i) \) and \( K = (K_1, K_2, \ldots, K_j) \), the former is the test sequence and the latter is the standard sequence, the lengths of both are \( i \) and \( j \), and the general case \( i \neq j \), whose matrix is defined as shown in Equation (14):

\[
D = \begin{bmatrix}
    d(H_1, K_1) & d(H_1, K_2) & \cdots & d(H_1, K_j) \\
    d(H_2, K_1) & d(H_2, K_2) & \cdots & d(H_2, K_j) \\
    \vdots & \vdots & \ddots & \vdots \\
    d(H_i, K_1) & d(H_i, K_2) & \cdots & d(H_i, K_j)
\end{bmatrix}
\]

where the corresponding angular features of the two action sequences possess the Euclidean distance expressed as \( d(H_i, K_j) \).

If there are \( x \) corresponding frames between these two action sequences, calculate the average of the sum of the distances of all corresponding frames contained in them according to Equation (15):

\[
L_{\text{Angle}}(H, K) = \frac{1}{j} \cdot \sum_{n=1}^{i} L_{\text{Angle}}^n(K'_n, K_n)
\]

where the corresponding frame of \( K_n \) in \( H \) is denoted as \( K'_n \) and the Manhattan distance between the two is denoted as \( L_{\text{Angle}}^n \).

Let the velocity feature of \( K_n \) be denoted as \( v_n \) and the velocity feature of the corresponding frame as \( v'_n \). The distance between \( H \) and the velocity feature can be calculated according to Equation (16):

\[
L_{\text{Speed}}(H, K) = \frac{1}{j} \cdot \sum_{n=1}^{i} L_{\text{Speed}}^n(K'_n, K_n)
\]

where the corresponding frame of \( K_n \) in \( H \) is denoted as \( K'_n \) and the Euclidean distance between the two vectors is noted as \( d \).
After obtaining the distance between the two action sequences, the smaller the value indicates the higher similarity of the two actions, and vice versa, the lower the similarity. If the distance values are expressed as scores, i.e., the larger the distance value, the smaller the score, the mapping formula for the two sequences is shown in (17):

\[ S = \lambda \cdot (S - \theta) \]  

(17)

where the mapping parameters are expressed as \( \lambda \) and \( \theta \).

THE EFFECTIVENESS OF ARTIFICIAL INTELLIGENCE TECHNOLOGY IN ART AND DESIGN EDUCATION CLASSROOM

According to the above design of the art design classroom system based on artificial intelligence technology, the teacher needs to go through three parts in completing the whole teaching process, and each part is chosen to be supported by suitable artificial intelligence technology. In order to better verify the application effect of AI in art design classroom, this paper selects an art design class for teaching experiment to verify the application effect of AI technology in three modules of the classroom system. As shown in Figure 3, the recognition effect of face recognition technology in the art design classroom is shown. From the results in the figure, it can be seen that the face recognition technology can effectively recognize most of the students’ face situations, and a few students’ recognition failure is due to the influence of obscuration or the students’ sitting posture, which cannot recognize the students’ faces at the moment. But the face recognition technology in classrooms is not only applied in classroom attendance, but also its ability to carry out the collection of student and teacher classroom behavior information. This collection process is continuous, and the failure of recognition at a certain moment has relatively little impact on the data collection, but still needs to be supplemented with data based on the already collected data.

First, the Kinect device was used to capture the students’ facial images and depth information, which included 3D face information such as facial contours and depth images. Next, the images
captured by Kinect are preprocessed, including operations such as image resizing, grayscaling, and histogram equalization, to improve the accuracy of subsequent feature extraction. Then, utilizing the 3D information provided by Kinect, we can adopt a deep learning-based approach for feature extraction. By using deep neural networks, more complex and advanced face feature representations can be learned to improve the accuracy of face recognition. The extracted features will be stored in a database along with the students’ personal information. In the classroom, a Kinect device is used to capture the student’s facial image and compare and match it with the information in the database to record the student’s attendance. To improve the accuracy and robustness of the system, we can continuously improve and optimize the algorithm. This includes increasing the diversity of the training dataset, tuning the parameters, and considering the use of multiple feature extraction algorithms and classifiers. Throughout the process, we also need to ensure the protection of students’ privacy and data security and take appropriate measures to ensure compliance.

Shown in Figure 4 is the effect of Kinect technology human movement recognition in an art design classroom practice interaction. Art design itself is a carrier to express the designer’s emotions and thoughts, corresponding to the designer’s ability to express and communicate ideas to cultivate more. In the classroom, teachers can realize an immersive teaching experience through human-computer interaction so that students can experience the art design environment and practice needs more realistically. From the recognition results in the figure, we can see that Kinect technology can effectively recognize students’ movements based on human body joint points and node angles. The yellow skeleton in the figure indicates the student’s action in the previous frame, the blue skeleton indicates the current student action, and the line between the motion joints indicates the instantaneous speed of the joint nodes.

On the basis of effective recognition, the DTW matching algorithm used in Kinect technology and the traditional matching algorithm were compared in the test, in which the standard sequence of actions was twenty-four and all were processed by random up-sampling or down-sampling. The data in the figure (5) shows that the angle scores obtained by the DTW algorithm are higher than the traditional algorithm, and the difference between the two is larger. The test sequences in the experiment were obtained by multiple degrees of sampling, in which the action posture meets the
standard requirements and the angle score values obtained by the algorithm should be relatively high. Therefore, the DTW matching algorithm shows better accuracy and performance in the comparison experiments and can provide better technical and data support for human body recognition in art design classrooms.

The videos captured in this paper include videos from the student’s viewpoint and the teacher’s viewpoint as well as the teacher’s panoramic viewpoint. The emotions of teachers and students in the classroom receive only the influence of teaching and learning activities. There is no interference from other matters.

Data preprocessing is performed on the classroom teaching video, and the appropriate interception interval of the video is set to intercept the image into frames. In addition, the interception interval can also be adjusted according to the precision of the analysis, and in this study, it is set to intercept one frame image every 30 seconds, and a class is usually about 40 minutes long, so roughly 80 frame images will be intercepted for processing and analysis.

The video is intercepted by frame, and the human body detection algorithm is used to obtain the position of the character. Then, based on the result of human body detection, the image of the character is intercepted, and face detection is performed to get the coordinates of the face. Finally, the intercepted faces are fed into a convolutional neural network for classification to get the final emotion recognition result.

Figures 6 and 7 show the results of AI technology on the mood changes of teachers and students in the art and design classroom. From the data in the figures, we can clearly see the trend of emotional changes of teachers and students throughout the classroom process, which shows that the emotional
fluctuations of both teachers and students during the classroom are not kept in one state. That is, it shows that the teacher’s classroom content affects the emotional changes of students and the classroom situation also affects the teacher’s emotion. Effective classroom content results in a greater proportion of positive teacher and student emotions throughout the same available emotions. Therefore, after obtaining the data related to teacher and student mood changes, the AI technology also has to calculate the teacher and student mood rates using time and frequency as evaluation indicators. According to the calculation of teacher mood change data information in Figure 6, it can be obtained that the teacher’s positive mood frequency and time are relatively high, and the mood rate can reach more
than 60%, which indicates that the teacher’s mood tends to be positive during the whole lesson. The students’ positive emotions and time obtained from the calculation of the information of the students’ emotion change data are lower than the teacher’s; the positive emotion rate is lower than 44%, and the overall emotion is relatively neutral. This indicates that the teaching effect of the art and design class only met the basic goal, and the teacher’s effect in motivating students was relatively weak and needed further strengthening. At the same time, the attraction point of the teacher’s teaching content for students can be further optimized.

Figure 8 shows the result of the comprehensive mood change in the art and design classroom. The result is a comprehensive mood change obtained from the results of teacher mood scores and student mood scores, calculated according to certain scaling rules, thus ensuring the accuracy of classroom mood identification and results. The data in the figure show that the complete classroom emotional performance is more positive, but there are individual moments with very obvious emotional score changes in magnitude, which requires teachers to conduct specific analysis after class based on relevant data information to further optimize the teaching process and content.

As shown in Figure 9, teachers and students evaluated the effectiveness of the application of AI technology in the art and design classroom. The results show that teachers mostly believe that AI technology support can provide more teaching modes for art design courses, improve teaching effectiveness, provide teachers with more classroom and student data information, improve the teaching information collection and feedback module, and provide teachers with more data basis for teaching improvement and optimization. However, there are also teachers who believe that although the application of AI technology has improved teaching quality to a certain extent, it will affect the development of teachers’ professionalism, while too much emphasis on the application of AI technology tends to ignore the essence and purpose of classroom teaching and makes teachers relax their supervision efforts on students. The results of student evaluations show that most students are positive about the use of AI technology, which can enrich classroom content and diversify presentation methods to better meet students’ needs. In addition, the use of AI technology has improved the efficiency of classroom teaching and learning, saving more time and manpower. The intelligent and personalized teaching methods stimulate students’ motivation for independent learning and exploration.

Figure 8. Results of integrated mood change in the classroom
Questionnaires were distributed to students and teachers after the class to find out if AI was recognized, and after counting, the vast majority agreed that AI for the course helped to improve the quality of teaching and increase classroom interaction. Only 10% thought that AI was not very helpful, and 12% thought that the use of AI in the classroom would make people lose sight of the purpose of teaching. This shows that the majority of teachers and students recognize the positive effects of AI.

In summary, the application of artificial intelligence technology in art and design classrooms can provide reliable technical support and data information for teaching, diversify teaching methods, improve teaching efficiency, increase the interaction between teachers and students and between students, and promote the communication of emotional expression. At the same time, classroom emotional score analysis can help teachers better grasp students’ learning, analyze the shortcomings of existing teaching, and actively improve and refine it.

CONCLUSION

After the verification of the experimental results, the art design classroom model based on artificial intelligence technology designed in this study shows a positive role in the field of education. By applying face recognition technology to realize classroom attendance management and data collection tasks, machine learning to analyze teacher-student mood score data and calculate the proportion of positive moods in the classroom, as well as using Kinect technology to increase the interactivity of classroom content, the model provides teachers and students with more space for communication and creativity.

Students and teachers recognize the positive role of AI technology in classroom applications and believe it helps teachers better achieve classroom goals and improve teaching quality. The application of face recognition technology can effectively realize classroom attendance management, the use of machine learning can objectively assess the proportion of positive emotions of teachers and students in the classroom, and the introduction of Kinect technology increases the interactivity of classroom content.
In summary, the art design classroom model based on artificial intelligence technology brings innovation to the traditional art design classroom and expands the communication and creative space for students and teachers. The application of the model has proved to be a positive contribution to improving teaching effectiveness and promoting educational reform.

In educational scenarios using AI technologies, we must address ethical and privacy concerns by protecting students’ personal data, ensuring fairness and transparency in decision-making, balancing technology with traditional teaching methods, and considering the impact on teachers’ roles and career prospects.

**DATA AVAILABILITY**

The figures used to support the findings of this study are included in the article.

**CONFLICTS OF INTEREST**

The authors declare that they have no conflicts of interest.

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