College Art Education Model Based on Internet of Things and Digital Media

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ABSTRACT Students from a variety of fields can learn music, calligraphy, dance, theatre, cinema, and art and gain essential practical skills that essentially enhance their artistic possibilities and characteristics that foster the development of morality, intellect, physicality, and aesthetic literacy among college students in the College Art Education Model (CAEM) . The aesthetic principles cultivated in CAEM are fundamental to diverse design disciplines and creative practices. The art education faces systemic challenges in pedagogical logic, particularly the misalignment between abstract artistic objectives and measurable learning outcomes, which impedes curriculum standardization and assessment validity. The Internet of Things serves as an infrastructure for continuous data acquisition and contextual awareness in college art education, enabling real-time monitoring of learning behaviors and resource utilization. Digital Media (DM) is a college art education that exceedingly effective students can be instructed in knowledge assessment, practical operation, collaboration, and lifelong learning. The CAEM-DM method proposed in this study demonstrates how digital tools can enhance the visualization of artistic elements, which is applicable to modern visual design and digital creative education . A CAEM-DM method for developing the cost-effectiveness of the innovative route in art education, the link with teachers, students, and teaching materials, and an effective model for distributing information in art teaching and extracting its potential. College students' satisfaction with art education is up to 91% due to the study's actual teaching activities, showing that this experiment is relatively impactful, influential, and stirs up students' emotions. The IoT layer may be implemented through low-cost wireless sensing modules in classroom and studio environments.

INDEX TERMS college art education,internet of things,digital media,learning analytics,wireless classroom sensing

I. OVERVIEW OF THE COLLEGE ART EDUCATION MODEL, USAGE AND ITS IMPACT

CAEM is an essential idea of the education process and can enable students' creative imagination and creativity in various aspects of life, and appreciation of beauty, developing responsible associates of culture [1]. College art teachers can utilize excellent adaptive teaching abilities to guarantee that the artistic skills developed are of high quality. The above art education studies emphasize strategy analysis and skill development with college art teachers' flexibility [2]. Education in the arts is an essential idea of modern education, serving both to improve students of a collective and to develop the succeeding generation of artists and art professionals [3]. The educated can gain design knowledge and develop aesthetic ability through appreciating exceptional works of art due to the cultivation of appreciation and the supplementation of innovative capacity [4]. CAEM, a broad field of education, places increased demands on students' ability to innovate further on the screen. However, the need to develop creative potential can be provided through the standard method of motivating knowledge [5]. Morality is essential to a student and a culture, and college students desperately need it, especially currently. Art colleges and university education can emphasise increasing the formulation and implementation of creative ideas in the strategy [6]. Many art and non-art colleges are paying more attention to teaching and learning college art. More substantial use of innovative teaching ideas and models is required in light of various issues with art education [7].

The main problem of modern culture is the social heterogeneity expressed in education and art. As the equal time, the issue of social equality is assigned a great deal of stress [8]. Intelligent data collection and systemic multi-information fusion approaches have been implemented to elevate the quality evaluation and accuracy of art education systems [9]. Such technological advancements also provide new possibilities for the digital simulation of fabric textures and patterns in virtual environments. The media's interest in art is growing with the advancement of the economy and culture and the advance-ment of social civilization. The

surging interest in media arts has necessitated advanced simulation models utilizing deep learning and improved vector machine algorithms for precise university teaching achievement evaluation [10]. A platform for art education IoT technology addresses the challenges of the existing digital art education platform's real-time output quality, resource responsiveness issues, the lengthy implementation costs. [11]. Digital media art education needs a professional, uniform, scientifically-based teaching approach and tools for professional, scientific knowledge guiding planning students that are exclusively trained in professional courses find it challenging to understand and study digital media art design [12]. The importance of cognition research in art education strategy, practice, and research, and a conceptual framework is provided to improve cognitive identification, growth, and application [13]. The application for measuring the quality of art education instruction established the efficacy of the established technique. In the future, creators can continue to work on applying cross entropy to more domains [14]. This research investigates the method, strategies, and evaluations of art education at colleges and universities to increase art and design implementation and increase college students' overall quality. Digital media and advertising IoT applications require a tailored system experience that assesses and responds to each customer's needs and interests. This includes fundamental behavioural patterns, spending patterns, tastes, cultural traits, and associated characteristics. If IoT is fully optimized for usage with digital media, active, linked gadgets can automatically create posts, and user shares regularly standard criteria [15].

The Main Contribution of the Paper

- To develop the teaching efficiency of college art education based on innovative ideas and design thinking.
- The college art education model and the internet of things can be improved with digital media.
- College Art Education Model enabled Digital Media (CAEM-DM) is profitable to students' overall develop ment and exposure. Their determination, talent, and passion can result in a successful career.
- The experimental result has been validated with art education counterparts regarding performance, accu racy, efficiency and error rate.
- The remainder of the paper is in section 2 for a literature review of the existing method; section 3 proposes the technique of CAEM-DM to be discussed; section 4 the result and discussion; and section 5 concludes with the impact of the paper.

II. LITERATURE REVIEW

Quan Liu et al. (2021) detailed an interactive Multi Media and Virtual (MMV) technology fusion model, which the model validates [16]. It has immeasurable social, cultural, and anthropological relevance in enabling the all and healthy growth of humans. Early implementations of multimedia technology in art education often faced limitations in interactivity and contextual adaptability, which restricted their pedagogical effectiveness in dynamic classroom settings. This demands the employment of interactive fusion technology and effectively multimedia technology. An interactive teaching model for art education and teaching in a modern setting is made possible to develop media information systems.

Zhang Wen et al. (2021) introduced the AI-assisted Effective Art Teaching Framework (AIEATF) to construct intelligent teaching techniques, expand the ability to respond to AI-oriented art education, and enhance the environment and understanding of AI-assisted art teaching [17]. The effect of many factors, analytical research is lacking, and the indexing method is inadequate are just a few of the difficulties in improving the teaching abilities of technical art direction students. This research data provides helpful advice for art design instructors looking to enhance their teaching abilities.

Wenli Mao et al. (2021) discussed Vision Sensing (VS) technology to investigate the applicability of the combi nation of digital pictures and the use of art in art education [18]. Additionally, the approach must understand the projected light source's coding system and to object's exterior substance. The limitations of the education setting are solved through scene teaching combined with technology, which immerses pupils in an actual learning environment. According to the findings, VS technology shifts a reduction in the pace of functional detecting objects from the observation of volumetric organization to that of surface identification errors. Acarima Nanthanasit et al. (2018) illustrated that Augmented reality (AR) technology could help light and shadow function more [19]. In depicting the form in three dimensions using light and shade. However, the teaching technique makes it difficult for students to need neither previous experience with Light nor Shade to comprehend the method. This research approaches integrating an AR system with real-time rendering to improve the art education process, resulting in a novel learning experience and improved teaching quality. Ouyang R. formulated an instructional quality assessment system utilizing a BP neural network to facilitate objective and unbiased evaluation of university online art classrooms [20]. The fairness and impartiality of the assessment of art education are difficult to capture in formal analysis and prediction. The empirical study findings show that the method for evaluating art education is suitable and capable of capturing students' artistic abilities. The BPNN model can accurately assess the quality of art education by evaluating and forecasting massive data in the field.

Zhang D. utilized a graph convolutional network to optimize teacher teaching paths in art education, ensuring the path design aligns with the optimal interests of instructors and students [21]. This approach of optimiza tion for collegiate art instruction likewise satisfies the needs of teachers and students was used. As a result, this technique can potentially increase art education quality and encourage classroom change and innovation. Bo Li et al. (2020) dis-

cussed computer-aided (CA) technology, mainly thoroughly evaluating students' char acteristics, improving instructional techniques, and increasing students' overall quality [22]. As an essential component of higher education, art education at higher vocational institutions needs to develop a compre hensive and comprehensive theoretical knowledge system, and it is confronted with several practical issues. Beginning with the features of higher vocational colleges and their students, a preliminary investigation is made into the selection and setting of teaching materials and the usage and exploration of teaching techniques.

A few drawbacks of the college art education model are problems in the modern day. The approach can boost art education's effectiveness and justify the usage of instructional materials. Tasks are typically achieved individually for objective reasons like time, data knowledge, and subjective criteria like research ideas and attention. MMV overcomes the disadvantage of AIEATF, BPNN and graph convolutional networks compared with the proposed method CAEM-DM.

III. INTERNET-OF-THINGS AND DIGITAL MEDIA MODEL FOR COLLEGE ART EDUCATION

CAEM-DM can be observed as a subject to the current arrangement of clearly established responsibilities in the social economy and specialized degree programs in art education. The CAEM-DM framework is formally defined as an integrated system that fuses IoT-driven behavioral sensing (e.g., attendance, gesture tracking, material interaction logs) with digital media-based learning analytics to generate real-time pedagogical feedback. This technical definition distinguishes CAEM-DM from generic discussions of IoT benefits and anchors the model in measurable data flows and educational interventions. It can be characterized as a strategy for teaching that emphasizes the development of students' aesthetic understanding to enhance their capacity for creative artistic expression in college. Education is essential to a well-rounded education, emphasising the cultural experience. Colleges and universities, being the reproductive tract from which talents emerge, have a responsibility to develop the development of students' culture, and art instruction is an essential link in this process. Students' abilities, humanistic qualities, feelings, and purity of spirit can be developed via exposure to the arts. Access to accessible art education programs can encourage students to develop their artistic sensibilities, enhance their capacity for perceptual and creative insight, and ultimately strengthen their humanity. Aesthetic education centre's on art education, which is valued for its central role in developing wellrounded individuals rather than future artists.

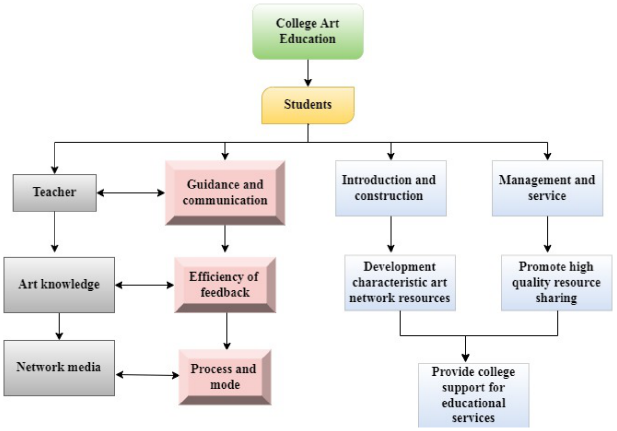

FIGURE 1. Teaching efficiency of college art education model

Figure 1 shows a crucial mechanism for creating and appreciating art and culture, which serves as a vital conduit for developing artists and cultures. The objectives of maintaining, classifying, modernizing, and generating culture are supported through art education. It is a distinct academic field and subject area. The initial unidirectional communication channel has never been enhanced from the standpoint of information transmission by effective knowledge conversion in art education. It is essential to renew and upgrade traditional disciplines, modify the professional training aims and construction priorities, maximize the talent training program, and promote teaching to enhance the benefits, qualities, and professional concentration. The conventional three-year course structure is unnecessary inside the context of the art curriculum, and various curriculum features can change the related architecture or student makeup. There is a networked, shared, and collaborative community of interests in teaching and learning; There is no apparent separation between people that provide, share, and learn from creative materials and between instructors and students. Teachers must allow students to understand, integrate, and grasp art fundamentals from the perspective of concepts and techniques and consider, assess, and summarize the processes involved in creating art. Through using direction create, fully utilizing the leading and leading role of effective organizational systems and pertinent groups, continually enhancing their research output and social influence, transforming decisionmaking more carefully, influencing attitudes, expanding the environment for learning and the power to see the big picture, and thus reduce the divide between what students are learning in education that the world requires in Figure 2 for the innovation idea has been explored after Figure 1 for the teaching effectiveness of the college art education model.

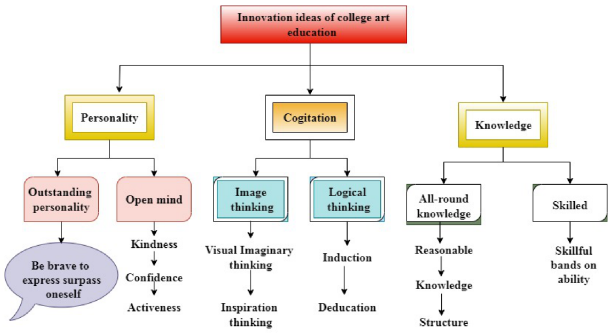

FIGURE 2. Innovation idea of college art education

Figure 2 shows that art education, like emotional education, can alter the educated intellectual sense and excite their desire for truth. Beauty can modify the way of thinking, mood and emotions, make it easier to inspire keen creative inspiration, and trigger and seize the innovation of ideas. The awe elicited by the attrac tive image stimulates the imagination and thinking function in the cerebral cortex, serving as a motivator for the search for truth and creation. College students' orientation toward the advancement of art education has a far-reaching impact on the promotion and popularization of excellent education in colleges and institutions. Creating a solid creative atmosphere and a reasonable basis for the effective growth of art education has a beneficial function in leading college students. Art education, as a vital component of excellent education in colleges and universities, adequately represents the demands of the modern day. Art education reform and innovation are trends in advancing excellent education in colleges and universities. Establishing a suitable creative atmosphere broadens the platform for art education. It allows for more comfortable and enjoyable educational activities in figure 3 for the college art teaching based on design thinking has been developed to discuss.

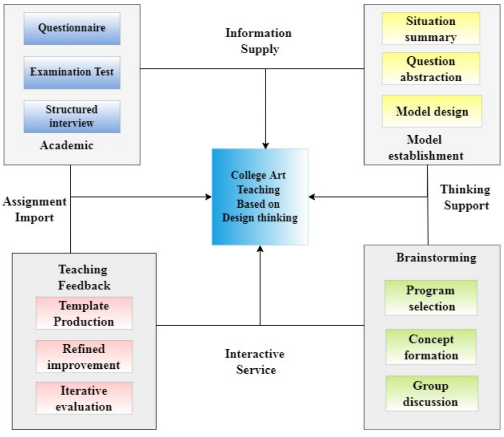

FIGURE 3. Design thinking based on the college art education model

Figure 3 shows that design thinking emphasizes the need to meet and enhance student learning requirements in a learning environment. Design thinking in CAEM-DM is not an isolated pedagogical module but is struc turally integrated with IoT data streams through a three-layer data processing pipeline: perception, cognition, and pedagogical action. Sensor data collected from IoT endpoints—such as engagement wearables and digital portfolio uploads—are mapped to cognitive indicators (e.g., interaction frequency, revision cycles), which di rectly inform adaptive design-thinking prompts delivered via the digital media interface. This kind of education mainly meets the demands of pupils for creating significance from existing information. The teacher may assist students in this phase by helping them construct the cognitive schema required for absorption, choosing a creative theme, and achieving the compliant behaviour of knowledge meaning production. The course aims to foster innovative thinking by emphasizing design thinking training, problem-solving approaches, and problemsolving exploration. A learning environment may be established as the primary delivery method for lectures in the classroom, and a scenario can be used as an incentive to promote student autonomy. The design thinking paradigm does not entirely reject all conventional forms of education. The difference is that education's goal is founded on design thinking. Traditional teaching styles exist, mainly in teaching activities like teaching and counselling. It can no longer only convey information. Instead, it focuses on helping students actively produce knowledge to develop a cognitive environment and knowledge structure. To carry out aesthetic education, design thinking art education should be combined with a professional curriculum, focusing on developing college students' creative imagination, aesthetic judgment, and logical theoretical ability through open guidance, interactive discussion, and the teaching method of the transformation of roles of subject and object. Links between design thinking and Colleges and universities offer a variety of art courses, including the following: During the academic research phase, students gather results such as interview transcripts, student comments, surveys, formal interviews, and structured interviews. By holding seminars and displaying important issues, learners are exposed to the effects of the underlying problem. During the brainstorming stage, learners can get tasks through real-world difficulties, interpersonal interactions, brainstorming, and other activities to design and develop the ideal law and program. In the prototype phase, learners choose the best concepts and visualize the prototypes; in the test feedback phase, learners complete quizzes, observations, assessments, and discussions. A crucial major in universities and colleges is the art design. It has the power to change long-established teaching strategies used in classroom education. Institutions must promote participative, democratic, and respectful teaching paradigms to adjust instructional strategies that place students in the centre of learning activities. As a result, teachers organize, assist, promote, and guide students during the teaching process; figure 4 for the Internet of Things and art education model has been discussed.

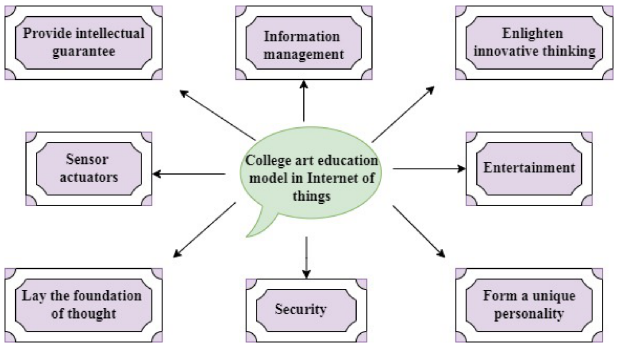

FIGURE 4. Internet of things in the college art education model

Figure 4 shows that art education positively influences the development of college campus culture. Art education is successfully incorporated into campus culture to produce a healthy campus culture environment by combining the present social and cultural circumstances. It significantly impacts many elements of college students' studies and lives. Art education in colleges and universities in the modern period reflects the times and serves as an essential guide for college students. It is completely reflected in the development of campus culture. A positive cultural environment significantly impacts the quality of college students. Assist college students in developing accurate thoughts and notions. The Internet of Things' primary goal is to enable intel ligent item identification, location, tracking, monitoring, and administration. Students can use the Internet of Things technology to share information with any person or thing by connecting to any Internet of Things network. The Internet of Things links numerous items to the Internet in a predefined manner. The Internet of Things architecture comprises three layers: perception, transport, and application. At the perception layer, short-range transmission and cooperative processing technologies enable the recognition and sensing of physical objects, from which relevant educational data are extracted and filtered for downstream analysis. Finally, data collecting and precision enhancement have been completed. Figure 3 Internet of Things based on art education has been discussed based on figure 4 for the digital media can be developed.

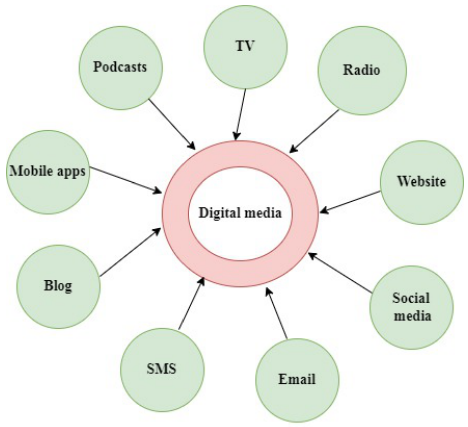

FIGURE 5. Importance of Digital media

Figure 5 shows that these interaction gadgets and the impact of digital media on everyone's lives are growing due to technological innovation and greater reliance on machines. Digital sources offer something fresh every minute, and more students are researching this information. The use of marketing on digital platforms is also expanding. The number of organizations operating on digital platforms, such as forthcoming radio stations, e-commerce websites, logistics firms, search engines, and so forth, has increased significantly during the past ten years. Marketers may access a sizable consumer base via digital media. The public can access social media marketing through television advertising, which has a quick and highly adaptable pace of information distribution. Customers can access additional channels for promoting their content through email marketing and short messaging services. Digital media, unlike traditional media like printing and television, allow for realtime measurement of effectiveness and interaction rather than just sampling or surveys. Real-time tracking is possible for podcasts and media connection subscriptions allowing publishers to update their content immediately. Figure 6 has an overview of the CAEM-DM way, as shown below,

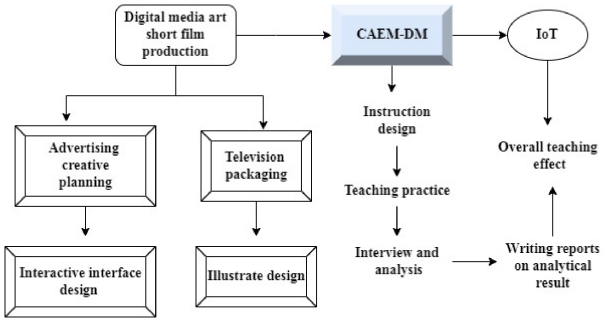

FIGURE 6. Overview of CAEM-DM

Figure 6 shows that CAEM-DM organizations, application education, advertising media companies, and other related challenges have established their professional growth and career goals. Many students can take the situation of

project teaching as the theme of their graduation design immediately. A few students can enter the unit practice through their contacts and teachers' recommendations; some students can enter the studio practice established by teachers; some students have developed a strong reputation through project practice, established their teamwork, and created conditions for individual innovation. The development's result evaluation can take the form of instructor evaluation and student collaborative evaluation to identify the best scheme and promote students' competitive consciousness. The CAEM-DM system processes raw IoT sensor data—such as wearable-detected engagement levels and digital workstation interaction logs—through a feature extraction layer that converts temporal and spatial behavioral patterns into pedagogical indicators. These indicators are then fused with digital media artifacts (e.g., draft iterations, peer comments) using a weighted attention mechanism to generate a composite knowledge assessment score for each student. According to the paradigm mentioned above, teaching can pique students' interest and excitement for acquiring knowledge and improve their talents in all aspects of collaboration. Several instructors can attend and observe the course in the teaching process to help enhance teachers' teaching levels. The teachers observing the class can comment on ways to improve the teaching. Instructors should do post-tests and interview analyses on students after teaching practice completion, analyze overall teaching efficacy, prepare related reports, and share the results with other teachers. We may better prepare for the next session through reflecting on, researching, and evaluating the entire teaching process. Instructors can use this strategy to change teaching design and practice in the next round of new project teaching to increase student learning and teachers' teaching level. The project education technique exposes students to many realistic and successful practical scenarios and encourages them to achieve "knowledge internalization" through project participation. The extensive project teaching resources can be utilized to expand the valuable teaching material of CAEM-DM teachers, develop a project-based practical teaching resource bank, and provide possibilities for students to practice.

There are numerous design schemes for interoperability in project education, and the interactive discussion connection supports the resource pool's building. Various methods for the same problem can help students explore extra broadly. Teachers should select relevant tasks to fulfil the demands of the digital media art specialization's practical teaching plan. Incidents can be chosen from digital media artists' short film creation, illustration design, interactive interface design, and creative advertising planning, depending on the course's focus and goals. Further IoT technologies enable more accurate student attendance tracking, scanning physical notes into digital media files, and wearable technology tracking student engagement. The IoT holds great potential for creating a more interdependent and cooperative learning environment in the classroom. Because of the increased connectivity provided by IoT devices, educators can now monitor their student's academic progress in real-time, from the materials they use to the channels through which they communicate.

$$P(\mu) = \frac{X}{\pi\left[X^2 + (\mu - \mu_0)\right]} \tag{1}$$

In equation (1), P is the probabilities densities; μ and μ_0 indicate the outcome of the integration and the initial stage of art education, and X is the scale parameter. The complexity of comprehension and using a confident art instruction approach for creativity is described as complexity. Integrating art education and in formation technology develops fundamental educational power via technological methods. Due to emotional development, Technology-driven innovation in the classroom has far-reaching implications for educational growth and education's vital capacity.

$$g(\alpha, \beta) = \sum_{i=1}^{u} (\alpha_i - \beta_i) \tag{2}$$

In equation (2), g indicates the efficiency variable; α and β are the cognitive processes and people associated with the art of instructing successfully; i is indeed the art teaching strategy's number plate, and u is the cluster total. The art's level of intricacy instruction technique is calculated using the efficiency as mentioned earlier function. Teaching is a complicated human activity that involves many different ideals. The speed of innovation dissemination is frequently positively correlated with the degree to which the effects of art instruction innovation are discernible in terms of application result, efficiency, and usability of technology. The price and expense control the efficiency of the art guidance path-finding framework components. The performance index is ideal if it has the lowest price and cost. The cost of art instruction under the optimum performance index is stated as

$$\min W_1 = \int_{i=1}^{u} \vartheta_i \, di \tag{3}$$

In equation (3), W_1 is the cost of the selected art instruction path, d_i greater practicability, and ϑ_i cost-effectiveness of the vast majority of goods and i services in life all indicate that the availability of high-quality education may be increased at a reasonable price. The cost of offering high-quality, mass art education must be reduced for art education and teaching reform to advance. Art instruction is the highest price according to the most efficient ranking expressed as

$$\min W_2 = \int_{i=1}^{u} \gamma_i \, di \tag{4}$$

In equation (4), W_2 indicates the price of each work along the route; γ indicates the price of the preferred art education route. As a result, the democratization and viability of art education are improved, and the volume, quality, and

cost-benefit ratios are balanced. The chosen art education technique's performance index can be described as

$$\min W = \tau W_1 + (1-\tau)W_2 \tag{5}$$

In equation (5), W indicates the effectiveness of the chosen art instruction route; τ represents the balancing coefficient. Art education must inspire students' creative ideas and cultivate their creative potential. As a result, researchers can employ cognitive direction during the instructional process. Establishing questions or discussing can help to realize the driving force behind creative thinking. The most significant benefit for students in thinking and participating in the discourse is never the entire legacy of the teacher's knowledge but instead the learning process of thinking.

$$A = \begin{cases} A_{k'} \\ A_{l'} \quad \delta \leq \eta \end{cases} \tag{6}$$

In equation (6), A symbolizes the cosmos object selected by the spinning system; $A_{k'}$ and $A_{l'}$ represent l, the universe's items, and δ the set of numbers; η reflects the rate of normalized expansion The iron triangle formed by scale quality and cost balance limits conventional instruction as vectors influencing the impact of art education. Additionally, this limits efforts to change art education and enhance the learning experience. The efficiency of art teaching is a CAEM-DM method, and understanding the student is essential to the learner's available potential. However, many instructors lack a sense of accountability and devotion, teaching in the instruction, paying attention to students and creating a healthy relationship between teachers and students, resulting in the teacher's on students' learning situations and existing problems being apparent.

IV. RESULT AND DISCUSSION

CAEM-DM and universities strongly impact college students' ideology and value orientation. The advancement of art education has a far-reaching effect on promoting and popularizing excellent education in colleges and institutions. Creating a solid creative atmosphere and a good platform for the effective development of art education has a beneficial function in leading college students. Art education, as a vital component of excellent education in colleges and universities, adequately represents the demands of the modern day. Art education reform and innovation is a movement to advance excellent education in colleges and universities. An excellent creative atmosphere gives a larger platform for art education, and instructional activities can be more comfortable and entertaining.

A. DATASET DESCRIPTION

Unrestricted, the link between appreciation, the influence over cognitive beliefs, emotional well-being, and both academically and interpersonal identity was examined in this study. This dissertation aimed to further our understanding of the factors that influence college students' academic achievement. The quantitative non-experimental design was used. A 38-item survey with a sample size of 206 students from four-year art colleges asked them about their levels of thankfulness personal satisfaction, overall effectiveness, educational effectiveness, the influence of 100 randomly selected students' perspectives on learning. Informed consent was obtained from all subjects. No personally identifiable information was stored. The survey comprised questions from the General Perceived Self-Efficacy Scale (GPSS), the Motivated Strategies for Learning Questionnaire (MSLQ), the Satisfied in work rating Gratitude Questionnaire (GQ-6), and the Patterns of Adaptive Learning (PAL). The investigation's findings point to an essential connection between all variables. The ability to influence one's Educational identity, emotional health, learner ideas, and total personality were all significantly correlated with gratitude. Emotional well-being was correlated with control over one's learning beliefs, general self-efficacy, academic self-efficacy, and appreciation. According to logistic and multivariate regression models, gratitude accounted for 7.9% of the variance in technical life engagement and 6.3% of the variance in global self-concept. 4.9% of the variation in sanity and 16.3% of a variability in overall soul were indicated by emotional well-being. The results of this inquiry revealed a positive correlation with thankfulness, mental health, cognitive perspectives, and social and educational personality. Additionally, gratitude and subjective well-being predicted general university student' cognitive actualization skills. In examining pupils' effectiveness and regulation reactions following participation in instructional programs intended to boost appreciation and perceived health, further research can expand on the results. There are recommendations for interventions in schools and counselling.

TABLE 1. Error comparison of the proposed model in art education

Number of students	MMV	MUA	AIEATF	BPNN	CAEM-DM
10	40.2	49.3	60.3	48.8	20.3
20	38.1	45.2	60.7	55.9	19.2
30	19.5	17.8	28.3	40.1	33.4
40	26.3	20.9	35.2	58.9	29.1
50	26.2	20.3	28.4	60.7	44.2
60	29.2	33.5	46.8	64.4	31.9
70	50.2	26.7	39.5	58.3	26.1
80	30.3	48.3	58.6	62.3	48.5
90	41.3	36.3	59.6	63.2	24.1
100	32.3	53.3	65.3	47.8	18.1

Note: The "error" reported in Table 1 refers to the deviation between predicted and actual student perfor mance scores in standardized art competency assessments, calculated as the root mean square error (RMSE) across 100 test instances. This metric quantifies the model's inaccuracy in forecasting student learning outcomes based on multimodal inputs from IoT sensors and digital media interactions.

Table 1: shows the learning rate impacted the effectiveness of art education learning and evaluation. The learning rate is similar to ηa rise in learning volume, a high value, and rapid convergence, leading the network to oscillate. Inconsistent network efficiency and delayed convergence occur from a low learning rate. These challenges can be overcome by providing a momentum factor α

$$l = (n-1)\eta\alpha_i \tag{7}$$

The equation (7) l is an error comparison in art education at various learning rates, and n in the training intervals in i are learning evaluated based on the assessment results; as the learning rate varies, so does the number of training sessions. The number of student sessions has the most benefit; the lowest learning rate is 18.1%.

Figure 7 shows that college art education, a significant carrier of art and culture growth, continues to provide a vital mechanism for art and culture enjoyment and creativity. As a distinct educational subject and curriculum, art education is responsible for collecting, maintaining, categorizing, updating, and developing culture. The efficacy of college art instruction and the one-way nature of sharing knowledge has altered technique. The most effective method of acquiring art teaching knowledge is distribution.

$$p = q(c-1) \times 100 \tag{8}$$

In equation (8), p is the efficiency of college art education, q indicates the likelihood of the existence of teaching, and c is several students. Art education can stay up with the times by engaging in fission and development that is innovative and original. University art programs take a knowledge distribution approach to teach students to spread information amongst themselves and their peers. Compared to other methods, the ability to process, select, and apply specialized art knowledge actual activity and interaction. BPNN and MMV have a much more significant efficiency value improvement in the proposed way, 92.5%.

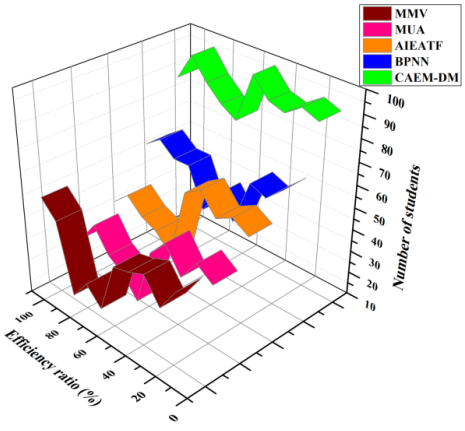

FIGURE 7. Efficiency of the proposed model in art education ratio (%)

TABLE 2. Digital media art evaluation with the proposed model

Number of students	MMV	MUA	AIEATF	BPNN	CAEM-DM
10	32.3	53.3	65.3	47.8	89.4
20	40.2	45.2	58.7	60.9	93.5
30	15	31.9	25.3	36.1	80.4
40	47.6	53.3	75.3	53.8	89.4
50	39.5	42.2	62.7	52.9	93.5
60	40.5	52.2	55.4	62.7	91.2
70	41.3	49.2	53.2	69.2	90.4
80	38.2	42.3	58.6	62.3	88.2
90	38.2	46.3	59.6	63.2	88.2
100	46.2	53.3	49.3	67.8	89.4

$$r_{ij} = \frac{y_{ij}}{N} \tag{9}$$

Equation (9) r_{ij} is a digital media of art education for students and y_{ij}. For learning quality in several students and N are the effectiveness of art education and instruction for evaluating to generated.

Table 2 says that evaluation involves a decision on the kind of art activity selected and its effectiveness changes in techniques, space, resources, and materials that instructors are meant to promote can be included in future improvements. The evaluation may be a productive and entertaining process that involves creativity and involvement to assist an organization in learning methods to achieve its goals more successfully. Evalu ation allows arts organizations to demonstrate the influence activities have in their communities. Innovative strategies are always looked for to assist students in excelling and achieving total learning growth to develop a more profound comprehension of subjects and improve the learning experience. The evaluation of college art education for the innovative idea is much greater than the proposed method at 89.4%.

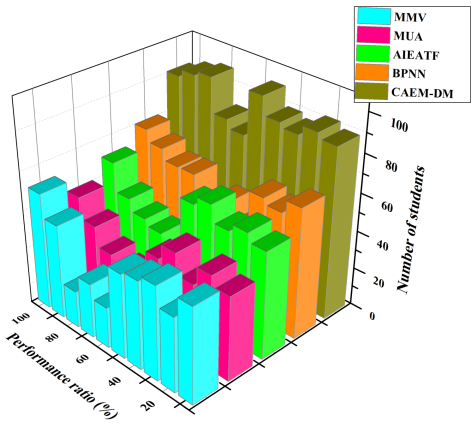

FIGURE 8. Performance analysis of proposed model ratio (%)

Figure 8 shows that the art education teaching model, on either hand, can allow students to comprehend and enjoy a vocal performance from many perspectives, leading to a singular view of the learning process. As a result, to improve the performance of art education teaching, college and university art teaching must adopt a new strategy for instructing artistic skills and develop a novel method of execution. Contrary to the commonly held assumption, engagement in the arts does not necessarily translate into improved academic performance in subjects such as mathematics, physics, or literature. Art education further promotes collaboration and group learning. The results indicated that arts education has a positive impact on knowledge and mastery of art forms, social and cultural awareness, creative and critical reasoning, creative and communicative capacities, individual and societal growth and consequences and improving the suggested technique value in performance ratio is 95.1%

TABLE 3. Comprehensive evaluation of digital media teaching based on art education

Number of students	MMV	MUA	AIEATF	BPNN	CAEM-DM
10	55.6	41.9	62.3	58.6	81.4
20	32.3	54.5	42.9	73.2	90.4
30	45.3	60.4	63.7	77.6	96.2
40	42.3	59.3	69.6	80.3	92.5
50	34.6	45.5	70.5	76.2	97.3
60	56.3	69.4	79.4	62.4	91.2
70	53.3	58.3	60.6	73.5	89.7
80	40.8	46.3	53.2	80.2	93.8
90	34.6	45.5	52.4	70.3	95.4
100	46.9	58.3	62.1	70.9	86.7

$$\omega = \sqrt{\frac{\lambda_{t_1}}{\varphi_{t_2}}} \tag{10}$$

Equation (10) ω is comprehensive evaluation teaching based on students in art education and λ_{t_1} is teaching management of process and φ_{t_2} for teaching evaluation for student findings of the essential and tertiary investigation, teacher quality evaluation results for artistic teaching at universities and colleges are calculated. Table 3 shows that teachers, students, and teachers of art courses have been examined. The proposed comprehensive approach for assessing teaching quality can determine the strength of many indicators based on the built assessment. However, the corresponding, ambiguous, full evaluation findings remain elusive. Increases in college and university teaching efficiency and quality may result from using this evaluation of

instructor quality; the assessment itself should be more fair, practical, and accurate outcomes compared to CAEM-DM proposed model can increase value by 86.7%

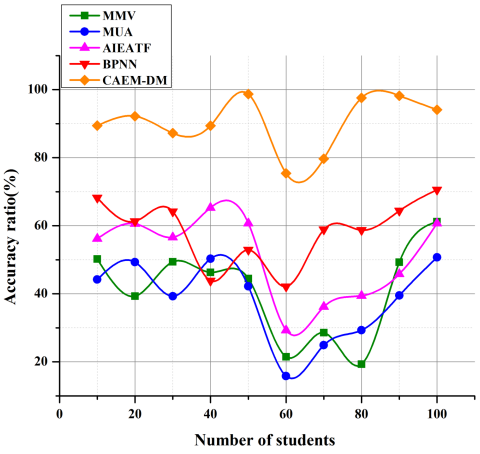

FIGURE 9. Accuracy analysis of teaching ideas in the proposed model ratio (%)

Figure 9 shows that teaching using the arts may visually convey complex subjects, making them easier to understand. Motor skill development, linguistic skills training, social skill building, judgment developing skills, risk-taking skills training, plus uniqueness are all enhanced by art education. To summarize, arts education may assist in building a culture that is more based on things that lead to greater meaningful creativity, a deeper awareness of self and others, and the ability to translate such understandings into beneficial action. Studies of learning via arts activities have influenced the burgeoning field of educational research and practice known as arts in education. Fairness, efficiency, and accuracy of grading systems; quality and efficacy of classroom instruction in tertiary institutions. Assessments of teaching quality can all be significantly improved by using this instrument to measure teaching quality teaching idea of art education evaluation results for BPNN and MUA to decrease the value compared between the proposed method value is much better than the accuracy ratio for 99.5% In future work, the development of art education abilities, skills and decision-making in interdisciplinary fields will be further explored to promote the sustainable development of the industry. By analyzing performance, efficiency, accuracy, and error rate metrics derived from the CAEM-DM framework, researchers can objectively identify the most effective implementation pathway and iteratively refine the model.

V. CONCLUSION

Art education cultivates aesthetic personality, increases humanistic quality, builds morphological thinking, cultivates the inventive spirit and practical skill, and improves students' capacity to experience, express, appreciate, and create beauty. Art education is an excellent technique to execute quality education for college students when the state strongly encourages quality training. The primary purpose is to illustrate art education's internal essential objective standard intrinsic to art education management. Education, being a distinct and separate topic, lends itself perfectly to investigating its fantastic worth. In conclusion, the art curriculum structure in university is an integral approach for us to execute excellent education and an effective means of improving college students' overall quality and promoting intercultural integration. CAEM- DM can assess teachers' capacity to communicate accurately. As a result, several inexperienced teachers at Colleges and universities use

ineffective teaching methods. Long-term teaching is difficult for pupils due to the low quality of art education courses at successful institutes in the classroom. This CAEM-DM method can improve art education's effectiveness and still accomplish resource allocation and utilization that is sensible in the administration of the art teaching process due to the limitations of subjective features like research art education ideas and the limits of from quite like period and information skills.

AUTHOR CONTRIBUTIONS

Ming Zhao: Writing
Chuanjie Wang: Data analysis

CONFLICTS OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relation ships that could be construed as a potential conflict of interest.

FUNDING

This was supported by Shaanxi Province's Educational Science Plan for the "14th Five-Year" Period 2025

General Project: "Research on the Integration of Art and Design Practical Teaching in Private Universities in Shaanxi Province and the Cultural and Creative Industry" (Project Number: SGH25Y3570); Project Source: Xi'an University of Foreign Affairs High-caliber Talent Startup Fund Project, School-level project, "The Historical Evo lution of Chinese Painting Paper Materials and Its Impact on Modern Painting Creation" (No.: XAIU2025100).

ACKNOWLEDGEMENT

Not Applicable

REFERENCES

[1] B. Turkcan, "Cultural Heritage Studies through Art Education: An instructional application in the ancient city of Aizanoi," Eurasian Journal of Educational Research, vol. 19, no. 83, pp. 29-56, 2019, doi: 10.14689/ejer.2019.83.2.

[2] F. Kong, "Evaluation model of adaptive teaching ability of college art teachers," International Journal of Emerging Technologies in Learning (iJET), vol. 15, no. 9, pp. 143-155, 2020, doi: 10.3991/ijet.v15i09.14031.

[3] N. Li, "Enhancement Strategies for Classroom Teaching Effect of Professional Art Education," International Journal of Emerging Technologies in Learning (iJET), vol. 16, no. 6, pp. 137-153, 2021, doi: 10.3991/ijet.v16i06.21091.

[4] X. Chen and Y. Gao, "Application and Innovation of Using Virtual Reality in Art Education," In Proceedings of the 9th International Conference on Education and Management (ICEM 2019), 2019, doi: 10.25236/icem.2019.150.

[5] Y. Du, "Exploration of College Art Education Based on Design Thinking," 2019, doi: 10.25236/icem.2019.152.

[6] L. Yang, "Research on the Application of Art Education Form in the Cultivation of College Students' Humanistic Literacy," 2019, doi: 10.25236/icetem.2019.136.

[7] F. Gao, "The Application of New Media in College Art Education Teaching," 2019, doi: 10.25236/icemeet.2019.074.

[8] O. Malytska, I. Patron, N. Chabanenko, O. Shvets, A. Polishchuk, and L. Martyniv, "Development of Art Education as a Basis for Sustainable Development of Society," Postmodern Openings, vol. 13, no. 1 Sup1, pp. 247-265, 2022, doi: 10.18662/ po/13.1Sup1/425 .

[9] W. Ziming, "Research on intelligent data collection and quality evaluation of computer science and art education systems based on systemic multi-information fusion approach," International Journal of Computer Applications in Technology, vol. 78, no. 1, pp. 63-71, 2026, doi: 10.1504/IJCAT.2026.151385.

[10] L. Chen, "Simulation of university teaching achievement evaluation based on deep learning and improved vector machine algorithm," Applied Artificial Intelligence, vol. 37, no. 1, Art. no. 2195221, 2023, doi: 10.1080/08839514.2023.2195221.

[11] W. Zhu, "Study of creative thinking in digital media art design education," Creative Education, vol. 11, no. 2, pp. 77-85, 2020, doi: 10.4236/ce.2020.112006.

[12] R. Feng, T. Li, and J. Dong, "New media fine art education platform based on internet of things technology," International Journal of Internet Protocol Technology, vol. 14, no. 3, pp. 131-138, 2021, doi: 10.1504/IJIPT.2021.117410.

[13] R. Heaton, "Cognition in art education," British Educational Research Journal, vol. 47, no. 5, pp. 1323-1339, 2021, doi: 10.1002/ berj.3728.

[14] X. Ling, "Model for evaluating the art education teaching quality with uncertain information," Journal of Intelligent & Fuzzy Systems, vol. 37, no. 2, pp. 1967-1972, 2019, doi: 10.3233/JIFS-179258.

[15] G. Hongxi, "The Functional Mechanism of Art Education in College Students' Quality Education and Aesthetic Education," 2019, doi: 10.25236/icetem.2019.138.

[16] Q. Liu, H. Chen, and M. Crabbe, "Interactive study of multimedia and virtual technology in art education," International Journal of Emerging Technologies in Learning (iJET), vol. 16, no. 1, pp. 80-93, 2021, doi: 10.3991/ijet.v16i01.18227.

[17] Z. Wen, A. Shankar, and A. Antonidoss, "Modern art education and teaching based on artificial intelligence," Journal of Interconnection Networks, Art. no. 2141005, 2021, doi: 10.1142/S021926592141005X.

[18] W. Mao and B. Zhang, "The Use of Digital Image Art under Visual Sensing Technology for Art Education," Journal of Sensors, 2021, doi: 10.1155/2021/4513577.

[19] A. Nanthanasit and N. Wongta, "Approach augmented reality real-time rendering for understanding light and shade in art education," In 2018 International Conference on Digital Arts, Media and Technology (ICDAMT), 2018, doi: 10.1109/ ICDAMT.2018.8376498.

[20] R. Ouyang, "Construction of online classroom instructional quality assessment system of university music based on BP neural network," Scientific Reports, vol. 15, no. 1, Art. no. 14250, 2025, doi: 10.1038/s41598-025-98556-1.

[21] D. Zhang, F. Wei, and H. Xie, "Application of optimization of teacher teaching path in art education based on GCN," Journal of Engineering and Applied Science, vol. 72, no. 1, pp. 221, 2025, doi: 10.1186/s44147-025-00781-y .

[22] B. Li, "Analysis of the Teaching Contents and Methods of Art Education in Higher Vocational Col leges Based on Computer-aided," Journal of Physics: Conference Series, vol. 1648, no. 2, Art. no. 022009, 2020, doi: 10.1088/1742-6596/1648/2/022009 .