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An evidence-based pathway for AI-enabled ideological and political education in senior high school arts curriculum

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Abstract. Senior high school arts curriculum is an important carrier for implementing aesthetic education and ideological and political education. Leveraging its advantages in multimodal information perception, generation, and analysis, artificial intelligence systematically elucidates the evidence-based mechanisms and practical strategies by which it empowers ideological and political education in senior high school arts courses across three dimensions: innovation of instructional content, reconstruction of the teaching process, and deepening of instructional assessment. This provides a new pathway for constructing "evidence-based" arts ideological and political education, aiming to steer arts-based ideological and political work from experience-driven practice toward scientific evidence, and from uniform instruction toward personalized cultivation, thereby achieving an overall enhancement of educational effectiveness.

Keywords: artificial intelligence, arts curriculum, ideological and political education, evidence-based pathway, multimodal assessment

1. Introduction

In the new era, aesthetic education in ordinary senior high schools emphasizes the fundamental task of "fostering virtue and cultivating people," requiring arts courses to go beyond mere skills instruction and aesthetic experience, to deeply integrate the core socialist values, and to achieve value guidance and spiritual formation for students. The *General Senior High School Art Curriculum Standards* (2017 edition, revised 2020) (hereinafter the "Curriculum Standards") stress that arts courses should "educate through beauty, foster virtue and cultivate people, and cultivate socialist builders and successors who are well-rounded in moral, intellectual, physical, aesthetic, and labor development [1]." However, traditional arts ideological and political education frequently encounters multiple bottlenecks in practice: instructional content is largely static and one-directional, making it difficult to evoke deep resonance in digital-native students; teaching processes tend to homogenize, lacking sensitivity to individual cognitive and emotional differences; and assessment has long been confined to subjective experience, hindering scientific evaluation and evidence-based optimization of the complex process by which values are internalized.

The rapid development of artificial intelligence, especially its breakthrough advances in multimodal information perception, generation, and analysis, offers new perspectives and a toolbox for addressing the above challenges. AI is more than a tool—it is an enabler capable of reshaping the educational ecosystem. It can dynamically generate highly contextualized, emotionally engaging ideological and political teaching resources, construct immersive and interactive narrative environments, and, by collecting and analyzing multimodal data from the learning process, provide precise insights into and scientific assessment of the process of value identification and internalization. This paper aims to systematically explore an evidence-based pathway through which AI empowers ideological and political education in senior high school arts courses. From the three dimensions of instructional content innovation, reconstruction of the teaching process, and deepening of instructional assessment, it constructs a data-driven, assessable, and optimizable "teaching–assessment" closed loop, with the goal of advancing arts ideological and political education from experience-led practice to scientific evidence-based practice, and of providing theoretical and practical support for a new paradigm of "educating through beauty and culture" in the intelligent era.

2. AI-empowered innovation of instructional content: realizing intelligent resource generation and adaptation

A mediatized world is increasingly permeating all areas of social life, and education has become an important site of "re-mediation" for cultural storage, memory transmission, and cultural dissemination [2]. The appropriateness and appeal of instructional content directly affect whether value education can truly reach students' minds and hearts. The *General Senior High School Art Curriculum Standards* (2017 edition, revised 2020) explicitly call for carefully selected disciplinary content, promoting the structuring of curriculum content around disciplinary "big concepts," guiding the contextualization of content through themes, and organically integrating elements such as the core socialist values and China's outstanding traditional culture. AI and Natural Language Processing (NLP) technologies provide powerful support for achieving these goals.

2.1. AIGC-supported generation of ideological-political resources and contextual adaptation

Traditional instructional resources—textbook illustrations, film clips, and the like—are largely static and unidirectional, and thus struggle to meet contemporary students' dynamic, personalized, and interactive cognitive habits. AI tools can, according to instructional themes and affective objectives, rapidly generate multimedia materials that combine artistic merit with ideological substance.

For example, in a lesson on "Patriotism and Family-Country Sentiment in Chinese Landscape Painting," a teacher might input the following prompt on the Huitun AI "Digital Human · AI Painting Creation" platform: "Generate a Chinese painting that blends the style of Fan Kuan's Travellers among Mountains and Streams (Northern Song) with modern aerospace elements (e.g., rockets, satellites), conveying the aesthetic mood of 'the fusion of tradition and modernity, and the symbiosis of technology and the humanities.'" The generated work (see Figure 1), while retaining the brushwork charm and aesthetic character of traditional landscape painting, incorporates aerospace imagery to convey an epochal narrative of national rejuvenation. Its visual impact and emotional appeal far surpass traditional textbook illustrations, effectively stimulating students' national pride and cultural identification.

Figure 1. Painting generated by the Huitun AI "digital Human"

Beyond static images, AI also demonstrates broad potential in generating and reconstructing dynamic audiovisual resources. In a film-appreciation module, teachers can use video-generation models such as Sora to automatically convert literary texts like Red Crag (《红岩》) or Red Star Over China (《红星照耀中国》) into cinematic-quality situational short films, vastly expanding the visual expression and narrative space available to ideological-political education. Such AI tools can intelligently parse textual content, and—based on contextual cues—automatically simulate professional camera techniques (dolly in/out, tracking, pan/tilt, close-ups and wide shots), precisely control lighting and color grading to set the emotional tone, and even imitate the editing rhythms and narrative styles of classic revolutionary films. In this way they construct highly immersive historical scenes and reenactments of heroic deeds.

Take for example, a recreation of the prison struggle of Jiang Jie: AI could employ low lighting, cool color grading, and close facial close-ups, combined with solemn, stirring music, to heighten the narrative's emotional force and gravity. This approach helps students not only learn the facts of the story but also feel the power of conviction, significantly enhancing the historical

narrative's authenticity and immersion, rendering heroic figures fuller and more moving, and effectively promoting students' deep shift from passive reception to active empathy, and from cognitive understanding to value identification.

2.2. Deep mining of ideological-political elements through NLP technology

Faced with the vast number of classic works of art, manual screening and annotation of ideological-political elements by teachers is inefficient and prone to subjective bias. Existing research has shown that "natural language processing technology has achieved remarkable results in the mining of ideological and political elements in curricula, and holds great significance for foreign language teaching" [3]. NLP technology can also perform semantic analysis, sentiment recognition, and topic modeling on texts such as art criticism, film scripts, and work introductions, automatically identifying value labels such as "patriotism," "dedication," "ideal," and "struggle," and constructing a structured knowledge graph of ideological-political elements.

For example, when systematically applying natural language processing and text mining to the script of the TV series The Age of Awakening (《觉醒年代》), an AI system can, through word-frequency statistics, semantic network construction, and topic clustering algorithms, accurately identify keywords that appear frequently and carry significant ideological-educational value, such as "faith," "youth responsibility," "revolutionary ideal," "patriotism," and "sacrifice." NLP can also utilize timestamp alignment and plot-association technologies to automatically extract related film segments—such as Chen Duxiu's speech "What Should New Youth Do?" or Li Dazhao's famous declaration "With my youthful self, I shall create a youthful nation"—and recommend them as core materials for classroom discussion.

On this basis, it is possible to construct a dynamically updated "Ideological-Political Arts Teaching Resource Repository" with a clear labeling system and intelligent retrieval functions. This repository can automatically categorize videos, texts, and supplementary materials according to instructional themes (e.g., "education on ideals and beliefs," "cultivation of patriotism"), and also support one-click combination and deployment of resources according to teaching needs and student profiles. This greatly reduces the burden of resource screening and lesson preparation for teachers, enhances the targeting of instructional design, and improves the scientific integration of resources, thereby achieving truly systematic and intelligent management of ideological-educational resources.

2.3. Evidence-based experimental design and multi-source data feedback

To scientifically verify the effectiveness of AI-generated teaching resources in ideological-political education, rigorously designed controlled experiments can be adopted to comprehensively evaluate the intervention's impact from both quantitative and qualitative dimensions. For instance, within the senior high school arts curriculum, a thematic module on "Red Art Classics" could be implemented with Group A (control group) and Group B (experimental group). Group A would use traditional instructional resources such as textbook illustrations and publicly available documentary clips, while Group B would employ AI-generated customized images along with curated video clips intelligently matched and edited from works such as The Age of Awakening and The Founding of a Party. To ensure reliability and validity, both groups should be balanced in terms of student number, gender ratio, artistic background, and ideological-political knowledge level, and taught by the same teacher to eliminate extraneous variables.

Post-class data collection should combine multiple research tools. Quantitatively, a Likert five-point scale questionnaire could be employed to measure two dimensions: "emotional resonance" (e.g., "This content made me feel inspired," "I developed a strong curiosity about revolutionary history") and "depth of thematic understanding" (e.g., "I can understand the collectivist spirit embedded in Sailing Ahead (《启航》)," "I can articulate the contemporary significance of the Red Boat Spirit"). At the same time, focus group interviews could provide qualitative insights through discussion of questions such as, "Which had a stronger emotional impact on you, AI-generated images or traditional textbook illustrations, and why?"

Expected results would likely show that Group B students score significantly higher than Group A in both emotional and cognitive dimensions. This would suggest that AI-generated dynamic and personalized resources are more effective in eliciting empathy and facilitating deeper construction of value connotations. Moreover, AI-assisted interview transcript analysis tools could be introduced: sentiment analysis algorithms could identify the distribution of positive and negative emotions; keyword extraction and topic modeling techniques could automatically summarize high-frequency emotional words such as "shock," "admiration," and "role model," as well as value category clusters such as "ideal," "faith," and "struggle." Such semantic evidence would further validate, at the level of linguistic cognition, the positive impact of teaching resources on students' value formation.

3. AI-empowered reconstruction of the teaching process: toward immersive and personalized experiences

Value formation is a psychological construction process grounded in emotional experience and active practice. The Curriculum Standards emphasize the need to "carry out contextualized teaching to improve students' ability to solve real-world problems" and to "explore the deep integration of information technology and arts education to transform teaching methods" [1]. The integration of artificial intelligence with Virtual Reality (VR), Augmented Reality (AR), and learning analytics opens up new possibilities for reconstructing teaching processes and enabling immersive and personalized ideological-political experiences.

3.1. VR/AR + AI for building immersive ideological-political learning environments

Virtual reality and augmented reality technologies, by creating simulated environments and blended virtual-real scenes, greatly expand the spatiotemporal boundaries of the traditional classroom, providing students with highly immersive experiences in artistic appreciation and historical contexts. The incorporation of AI further endows these environments with dynamic responsiveness and intelligent interactivity, enabling genuine "contextualized learning." Within this integrated framework, VR/AR constructs the sensory-immersive "field," while AI functions as the "intelligent agent" responsible for cognitive guidance and behavioral adaptation, jointly facilitating the shift of value education from external imposition to internalized experience.

For example, in a high school art lesson on the classic revolutionary oil painting Sailing—The First National Congress of the CPC, students wearing VR headsets can be "transported" into the cabin of the Red Boat at Nanhu, observing details of the meeting scene and participants' facial expressions and gestures. With AI-driven virtual character generation and natural language processing technologies, students can engage in "cross-temporal dialogues" with delegates such as Mao Zedong or Dong Biwu. When a student asks, for instance, "What is communism?", the AI character can draw on historical corpora and cognitive reasoning models to generate responses consistent with the delegate's identity and the historical context, while dynamically adjusting narrative rhythm and depth. Through real-time data capture—eye-tracking, gesture sensors, and behavioral logs—the system records students' focal attention, movement paths, and interaction frequency, analyzes their points of interest and confusion, and optimizes contextual guidance strategies. This significantly enhances students' sense of engagement and immersion, shifting ideological education from "passive reception" to "active exploration," and deepening understanding and identification with the founding spirit of the CPC through immersive experience.

In courses integrating elements of China's outstanding traditional culture—such as Peking Opera, paper-cutting, and shadow puppetry—the combination of AR and AI also demonstrates distinctive advantages. For instance, when appreciating Peking Opera facial masks, AR technology can use image recognition and 3D modeling to transform static textbook images into dynamic, rotatable 3D models, supplemented by animations illustrating the symbolic associations between mask colors and character traits. With tablets or AR glasses, students can "activate" opera characters, watch performance clips, and even simulate going "on stage" to participate through gesture interaction. In paper-cutting lessons, AR can convert traditional patterns into 3D models, enabling students to perform "virtual paper-cutting" through hand gestures, with the system providing real-time feedback on precision and aesthetic effect. Meanwhile, AI continuously analyzes students' operation paths, aesthetic preferences, and creative strategies, offering real-time guidance and personalized encouragement. This allows students to not only refine their technical skills but also gain deeper insights into craftsmanship, cultural inheritance, and traditional virtues, thus realizing the educational goal of "cultivating understanding through skills and nurturing people through beauty."

3.2. Personalized ideological and political education pathways supported by learning analytics

"Film and television education is a comprehensive practical education that integrates knowledge from multiple disciplines and embodies perceptual value, participatory value, and guiding value" [4]. However, in traditional ideological and political education within high school art courses, the prevailing reliance on uniform teaching content and processes makes it difficult to accommodate students' significant differences in cognitive foundation, aesthetic preferences, and levels of value identification. Such a "one-size-fits-all" teaching model often results in some students struggling to resonate with abstract content, while others may lose interest due to insufficient challenge. Both situations undermine the overall effectiveness of ideological and political education. Learning Analytics, as a key branch of educational artificial intelligence, "is exerting profound influence on education and teaching in today's information environment" [5]. By dynamically capturing and analyzing students' cognitive readiness, behavioral characteristics, and emotional states, it enables the construction of precise "personalized learning profiles." On this basis, differentiated ideological and political learning pathways can be tailored for each learner, thus realizing a new paradigm of truly individualized ideological education.

In practice, the system achieves a comprehensive understanding of students' learning states through three categories of key data. First, prior knowledge assessments (e.g., conceptual diagnostic items related to specific historical events or artistic contexts) help identify weaknesses in students' cognitive foundations. Second, process-oriented behavioral data are collected,

including video viewing duration and replay frequency on digital platforms, distribution of interactive click hotspots, movement trajectories and dwell time in VR environments, among others—behavioral traces that indirectly reveal students' interests and levels of concentration. Third, affective computing is integrated, using cameras or wearable devices to monitor facial expressions, voice tone variations, and other physiological signals, thereby gauging students' emotional engagement in class, such as confusion, resonance, or excitement. Through the fusion analysis of these multi-source data, the AI system generates structured and visualized learner profiles, annotated with labels such as "insufficient knowledge of modern Chinese history," "high sensitivity to visual arts," or "prone to empathy in collective narratives." Based on these learner profiles, the system can intelligently adjust teaching strategies and resource delivery, thus achieving genuinely personalized ideological and political cultivation. For instance, students with weak historical knowledge backgrounds may automatically receive AI-generated background animations or illustrated explanatory materials to establish necessary cognitive scaffolding. Students with strong empathy and expressive tendencies may be recommended emotionally intense film clips (e.g., scenes of soldiers' sacrifice in The Long March), and guided to participate in group narrative sharing, role-playing, or immersive theater activities, thereby maximizing the effectiveness of emotional education and value guidance.

Moreover, the system can dynamically adjust learning pathways in real time. When it detects that a student demonstrates both positive emotional response and cognitive mastery in a given ideological theme, it can appropriately introduce more complex and in-depth materials (such as relevant philosophical discussions or cross-cultural comparisons). Conversely, if signs of difficulty or frustration are observed, the system provides additional scaffolding resources or prompts, preventing disengagement and ensuring sustained participation.

3.3. Evidence-based process validation through multimodal integration

Evaluating the effectiveness of this teaching pathway requires moving beyond traditional approaches that rely solely on test scores or questionnaires. Instead, multimodal data fusion analysis should be employed to comprehensively and objectively verify both the learning process and the mechanisms of value internalization. Multimodal data, derived from different channels and dimensions of behavior, emotion, and cognition, allows for cross-validation that significantly enhances the reliability and validity of evaluation results—truly embodying the scientific concept of "evidence-based education."

The system first collects process-oriented behavioral data, which directly reflect the quality of student interaction with the learning environment. In VR/AR-based ideological and political scenarios, log systems can record students' time on task in specific scenes (e.g., average exploration time in the South Lake Red Boat meeting setting) to measure situational appeal. It can also track frequency of interactions (e.g., the number of conversations with AI-generated historical figures, or the number of times supplementary resources are accessed) to indicate active engagement and depth of exploration. Additionally, eye-tracking technology can generate visual heat maps to identify the elements that attract the most attention (such as facial expressions, flags, or slogans), thereby inferring students' focal interests and value-oriented attentional tendencies. These behavioral indicators reveal, at the external level, the degree of immersion and participation achieved through teaching.

Second, the system integrates emotional and cognitive outcome data to assess the actual effectiveness of value internalization. On the emotional level, embedded affective computing modules can capture real-time micro-expressions (such as pride, being moved, or solemnity), which, combined with semantic analysis of post-class interviews, provide insights into the depth of emotional resonance. On the cognitive level, standardized ideological cognition scales can be employed, focusing on dimensions such as "ideals and beliefs," "cultural confidence," and "collectivism." Pre- and post-instruction measurements, compared between an experimental group (immersive AI-supported learning) and a control group (traditional lecturing), help identify significant differences in cognitive gains. For example, if the experimental group demonstrates a significantly higher increase on the "cultural identity" subscale, it provides evidence for the effectiveness of immersive and personalized teaching interventions.

To build a more comprehensive and objective model of emotional response, physiological data can also be incorporated as supplementary validation. Using wearable devices (e.g., smart wristbands or Electroencephalography (EEG) headbands), continuous measurements can be taken of students' Heart Rate Variability (HRV), Galvanic Skin Response (GSR), and other autonomic nervous system signals. For instance, during the screening of heroic deeds, if significant increases in skin conductance and heart rate are detected, and these coincide with facial recognition results indicating "focused attention" or "being moved," then emotional engagement and inner resonance can be cross-validated. Such physiological data, with their high temporal resolution and resistance to subjective manipulation, effectively compensate for potential biases in questionnaires and interviews.

4. AI-enabled deepening of teaching evaluation: toward multimodal evidence-based assessment

Traditional evaluation in art courses has long been confined to the assessment of skills and knowledge, making it difficult to quantify the degree of value internalization. The Curriculum Standards emphasize the need to "adopt diverse evaluation methods" that focus on "students' learning processes and learning quality" [1], and advocate for the use of "information technology platforms" to support personalized and process-oriented assessment. AI technologies, particularly affective

computing and semantic analysis, provide a breakthrough pathway for building a multimodal and precise evaluation system for ideological and political education.

4.1. Affective computing for emotional response analysis

Affective computing, as a major branch of artificial intelligence, utilizes multimodal sensing devices such as cameras, microphones, and infrared sensors to capture students' facial expressions, vocal tones, and bodily movements in real time. Through deep learning and pattern recognition algorithms, it can infer and model students' internal emotional states. Incorporating affective computing into art-based ideological and political classrooms makes it possible to conduct fine-grained, real-time assessments of students' processes of value identification and emotional resonance, particularly suited to capturing fleeting yet authentic emotional reactions when engaging with specific ideological or aesthetic content.

A multimodal evidence-based evaluation system can, for example, employ intelligent visual sensors at the front of the classroom to detect subtle facial micro-expressions such as raised lips (signaling joy or agreement), furrowed brows (indicating confusion or reflection), or watery eyes (reflecting being moved). Audio sensors can analyze variations in pitch, speech rate, and vocal energy to assess emotional arousal and attentional focus. High-precision systems may also apply posture estimation models to recognize body movements such as leaning forward, clapping, or bowing the head, which serve as supplementary indicators of emotional engagement.

For instance, when students watch the "Flag Raising" segment of the film My People, My Country, the AI system can capture and aggregate the class's emotional feedback in real time, automatically generating a "class emotional response curve." This curve highlights the exact moments when collective emotional peaks occur (e.g., focused gazes, smiling, tears of being moved, solemn reverence), as well as the segments that elicit confusion or declining attention. Such emotional response data not only objectively reflect the affective impact of specific teaching resources but also provide teachers with critical feedback for optimizing pedagogical strategies. If an important ideological narrative fails to trigger the expected resonance, the teacher can dynamically adjust the pace, insert explanations or questions, or substitute alternative visual materials more conducive to empathy, thereby achieving closed-loop optimization and personalized intervention in the teaching process.

Moreover, affective computing data can be integrated with subsequent cognitive assessments and written reflections for multimodal correlation analysis, revealing the intrinsic links between emotional experience and value internalization. For example, do students who exhibit strong positive emotional responses during specific scenes also demonstrate deeper value comprehension in later discussions and writing? Such correlation analyses help construct a "emotion-cognition-identification" behavioral model, advancing art-based ideological and political education from a broad-brush approach to a precise, data-driven paradigm.

4.2. Semantic analysis for assessing value internalization

After students engage in art-based ideological and political education, the texts they produce—such as reflections on films, reflective journals, and transcriptions of classroom discussions—serve as important indicators of their cognitive and internalized understanding of values. These texts often contain rich subjective expressions and value judgments. However, under traditional evaluation models, assessment heavily relies on manual grading by teachers, which is labor-intensive, difficult to standardize, and limited in its ability to extract deep semantic meaning. By leveraging Natural Language Processing (NLP) technologies, these unstructured textual data can be effectively analyzed, quantified, and evaluated, enabling multidimensional and objective measurement of value internalization.

Semantic analysis techniques can integrate multiple NLP methods to perform in-depth semantic parsing of text. Sentiment analysis evaluates the overall or segmental emotional polarity of the text (positive, negative, or neutral) and its intensity—for example, the degree of students' admiration, emotional resonance, or identification with the revolutionary spirit. Keyword extraction and frequency statistics automatically identify core value terms in the text (e.g., "nation," "ideal," "struggle," "sacrifice," "faith") and quantify their occurrence and distribution. Topic clustering and semantic association analysis map the text content to latent topic distributions, enabling the identification of ideological and political themes such as "collectivism," "hero worship," or "cultural confidence," while also revealing the semantic network relationships between concepts. Opinion mining and stance detection further distinguish whether students remain at the level of factual description or have progressed to value reflection and the expression of personal positions.

For example, when analyzing students' reflections after watching The Age of Awakening, the system can not only count the occurrences of keywords like "belief," "responsibility," and "ideal," but also assess the contextual emotional tone—determining whether the student is merely summarizing the plot or genuinely expressing recognition and empathy. Texts that frequently use strong emotional words (e.g., "shocking," "inspiring") and successfully relate historical events to contemporary values generally indicate that the student has moved from "surface-level cognition" to the stage of "value identification." Conversely, texts dominated by vague or neutral expressions suggest that the student's comprehension is still shallow. The system can

automatically trigger supplementary learning tasks, such as recommending relevant readings or organizing additional discussions.

Furthermore, NLP models can perform longitudinal tracking across multiple time points. For example, comparing a student's texts written at the beginning and end of a semester allows assessment of growth in emotional depth and richness of value-related vocabulary, thereby evaluating the trajectory of value cognition. Such analyses can be presented at both the individual level and aggregated to provide class- or grade-level reports, offering teachers solid evidence for iterating and refining instructional strategies.

4.3. Multidimensional fusion assessment of ideological and political literacy digital profiles

In the evidence-based pathway of AI-enabled art and ideological education, constructing a "digital profile of ideological and political literacy" for students based on multimodal data fusion has become a key mechanism for achieving precise assessment and personalized cultivation. These digital profiles, presented in a dynamic, structured, and visualized format, comprehensively reflect the authentic status of students' value formation and development, overcoming the limitations of traditional evaluation methods, which are often singular, static, and one-dimensional.

The data foundation of the digital profile derives from full-chain collection throughout the teaching process, including: real-time emotional responses captured by affective computing (e.g., moments of empathy in class); deep textual analysis from semantic parsing (e.g., value judgments reflected in reflections and reviews); and learning behavior data (e.g., interaction frequency and path choices in VR scenarios). Through data cleaning, alignment, and fusion analysis of these heterogeneous sources, the AI system can extract multiple core dimensions—such as "emotional resonance," "cognitive comprehension depth," "strength of value identification," "cultural identity," and "social responsibility orientation"—and generate high-dimensional feature vectors representing a comprehensive view of students' ideological and political literacy.

To further enhance the interpretability and instructional utility of these profiles, the system typically employs various visualization methods. Radar charts clearly display students' relative strengths and weaknesses across dimensions, allowing teachers to quickly grasp their competency structure; trend curves track the evolution of key dimensions over time, reflecting the growth trajectory induced by instructional interventions; word clouds extract high-frequency value-related terms from textual data, intuitively illustrating the concepts and emotional intensity most salient to students.

For instance, a student's digital profile may show a prominent score in the "cultural confidence" dimension—manifested as active participation in related activities and frequent appearance of cultural symbols with strong positive emotion in textual reflections—while the "collectivism" dimension may be relatively weak, evidenced by limited interaction in group tasks and more emphasis on personal viewpoints in writings. Based on this profile, teachers can precisely recommend targeted learning resources, such as classic artworks reflecting team spirit or collaborative virtual creation tasks, thereby intentionally strengthening the student's collective consciousness and practical experience.

Importantly, the digital profile is not a static "snapshot" but a continuously updating dynamic model. It can record the evolution of students' ideological and political literacy over a semester, an academic year, or even the entire high school period, truly embodying the principles of developmental and formative assessment. Longitudinal tracking data not only provide feedback on teaching effectiveness but also offer students a basis for self-reflection and growth, motivating proactive construction of their values.

4.4. Evidence-based human-AI collaborative evaluation and visualization

The introduction of a "human-AI collaborative evaluation" mechanism represents a critical strategy for assessing the accuracy and robustness of AI-based evaluation models. In practice, multiple experienced Ideological and Political (IP) teachers can form an expert panel to independently score the same set of student outputs—such as reflections, art critiques, or project reports—while the AI system simultaneously analyzes and evaluates the same materials using trained multimodal algorithms. Inter-rater reliability can be assessed through Intraclass Correlation Coefficients (ICC) or Cohen's kappa, measuring both the consistency among human raters (i.e., scorer reliability) and the agreement between collective human ratings and AI-generated scores (i.e., criterion validity). If AI-generated scores exhibit a highly significant correlation with expert evaluations across multiple dimensions ($p < 0.01$), it demonstrates the AI system's potential to replace preliminary large-scale human assessment, while offering clear advantages in objectivity, stability, and efficiency.

Compared with traditional summative evaluation methods that rely on letter grades or numerical scores (e.g., excellent, good, fair, poor), AI-generated multimodal assessment reports provide not only quantitative outcomes but also strong interpretive and instructional diagnostic value. For instance, the system can integrate data from affective computing, semantic analysis, and behavioral tracking to generate comprehensive visualized reports, including: Emotional response heatmaps—illustrating the intensity and type of students' emotions at different moments while engaging with specific teaching materials, highlighting key moments of shared empathy and identifying potential instructional gaps; Textual analysis word clouds and semantic network

diagrams—extracting high-frequency value-related terms from students' written materials, displaying their density in a word cloud, and revealing the structural relationships among core concepts through semantic associations; Behavioral interaction maps—particularly in VR/AR teaching environments, visualizing students' movement paths, interaction targets, and dwell time, enabling teachers to assess exploration patterns and depth of engagement; Multidimensional radar charts and longitudinal trend curves—summarizing individual or group performance across dimensions such as "cultural understanding," "national identity," and "social responsibility," while enabling tracking over time.

These visualization components significantly enrich the depth and granularity of evaluation information and provide teachers with precise, intuitive evidence for instructional reflection and intervention. Educators can quickly identify students' weak points, understand obstacles in cognitive or emotional development, and design subsequent teaching strategies based on concrete data—for example, incorporating additional immersive experiences for students with weak emotional responses or recommending classic readings to address gaps in understanding specific value concepts.

5. Conclusion

This study systematically constructs an evidence-based pathway for AI-enhanced ideological and political education in senior high school art courses, revealing the mechanisms and potential of deep integration between intelligent technologies and value education. The findings indicate that artificial intelligence empowers a data-driven, precise, and efficient "evidence-based pathway" through innovations in teaching content, reconstruction of the teaching process, and deepening of assessment practices. This approach transforms value education from a traditionally ambiguous "soft task" reliant on individual teacher experience into a scientific, closed-loop process that is generative, experiential, and measurable, thereby providing a systematic solution to the longstanding challenges of ideological and political education in high school art curricula. As prior research has shown, "most students find technology-enhanced learning enjoyable and engaging" and, compared with traditional methods, "AI tools are praised for increasing motivation, skill proficiency, and learner preference" [6].

The core value of AI empowerment lies in shifting value education from a teacher-dependent activity to a structured, generative, experiential, and optimizable scientific process. It enables educators to perceive, understand, and guide students' value construction with unprecedented precision, ultimately enhancing the overall effectiveness of moral and aesthetic education. Naturally, AI-enabled art-based ideological education still faces deeper challenges, such as establishing ethical standards for multimodal data, achieving profound human-AI collaborative teaching, and evaluating the long-term sustainability of technological applications. Addressing these challenges requires concerted efforts from educational researchers, technology developers, and frontline teachers to advance this field from mere technological application toward innovative pedagogical paradigms, ultimately serving the fundamental educational goal of cultivating well-rounded individuals.

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