

Research on the Improvement Path of Aesthetic Education Literacy for Science and Engineering College Students—From the Perspective of University Counselors' Educational Field

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Abstract

Against the backdrop of the implementation of the educational policy of cultivating students through moral, intellectual, physical, aesthetic and labor education, aesthetic education, as a crucial component to fulfill the fundamental task of fostering virtue through education, is deeply integrated with ideological and political education in colleges and universities. Rooted in frontline work including daily student administration, ideological guidance and practical education, university counselors serve as vital practitioners extending classroom-based aesthetic education to extracurricular settings and remedying the deficiency in humanistic aesthetic cultivation among science and engineering students. Compared with students majoring in humanities and social sciences, students of science and engineering are dominated by rational thinking due to heavy coursework, experimental training and competitions for scientific research, commonly plagued by narrow aesthetic cognition, insufficient initiative to participate in aesthetic education, weak humanistic foundation and deficient creative capacity for aesthetics. Reliance merely on general art courses fails to accomplish all-round aesthetic education objectives. Based on grassroots educational practice of university counselors, this paper sorts out relevant national policies on contemporary aesthetic education and existing academic findings, defines the theoretical connotations of aesthetic education and aesthetic literacy, and systematically summarizes the physical and cognitive characteristics of science and engineering undergraduates. It identifies prominent obstacles hindering the implementation of aesthetic education for such students from three dimensions: individual students, counselors' educational practice and institutional guarantee on campus. Centering on counselors' core duties covering ideological guidance, class construction, cultural and sports event organization, social practice tutoring as well as collaborative education, targeted optimization approaches are proposed from six perspectives: educational philosophy, activity carriers, practical platforms, daily immersive cultivation, team development and institutional safeguards. The research facilitates the organic integration of ideological and political education and aesthetic education, promotes the coordinated advancement of professional proficiency, aesthetic literacy and sound personality for science and engineering students, and provides practical references for advancing grassroots aesthetic education in higher education institutions.

Keywords

Science and Engineering College Students; Aesthetic Education Literacy; University Counselors; Five-aspect Comprehensive Education.

1. Introduction

With the deepening reform of China's education system in the new era, central authorities have issued a series of regulatory documents represented by *Opinions on Comprehensively Strengthening and Improving School Aesthetic Education in the New Era*[1], explicitly incorporating aesthetic education into the comprehensive training system of morality, intelligence, physical fitness, aesthetics and labor skills. Colleges and universities are required to implement whole-staff, whole-process and all-round education, break the confinement of aesthetic education within art classrooms, and embed aesthetic education into daily ideological and political instruction and student management. Meanwhile, relevant policies specify the aesthetic education responsibilities of frontline ideological and political workers in universities, furnishing top-level policy support for counselors to carry out aesthetic education targeting science and engineering undergraduates. Amid the advancement of Emerging Engineering Education, most science and engineering universities retain a long-running school-running tendency prioritizing academic research over humanistic aesthetic education. Focused excessively on mathematics, physics, engineering and technical knowledge, science and engineering undergraduates suffer from inadequate aesthetic literacy, which gradually evolves into a bottleneck restricting the cultivation of interdisciplinary engineering talents. Hence, relying on the regular educational work of counselors to improve the extracurricular aesthetic education system has become a practical necessity.

Current domestic researches on aesthetic education predominantly focus on curriculum design of aesthetic courses, construction of public art faculty and macroscopic campus cultural development. Although studies concerning aesthetic education for science and engineering students keep rising year by year, specialized researches based on counselors' educational perspective combined with practical carriers such as university art festivals, social practice of "Going to the Countryside" on summer vacation, and daily class management remain scarce. Existing literature lays excessive emphasis on theoretical construction rather than grassroots implementation, incapable of guiding frontline counselors to carry out regular aesthetic education. In view of policy requirements, practical drawbacks and research gaps above, this study takes advantage of counselors' close-range educational superiority. On the theoretical level, it enriches subdivided research outcomes on aesthetic education for science and engineering majors, improves the theoretical framework of full-staff education and makes up for the existing research bias favoring in-class education while ignoring after-class cultivation. On the practical level, operable strategies formulated on routine counselor work can address formalized aesthetic education and low student engagement, balance rational professional study and perceptual aesthetic cultivation for science and engineering undergraduates, and accelerate the realization of the five-aspect comprehensive education goal in higher education.

2. Chapter 1 Definition of Core Concepts and Analysis of Aesthetic Characteristics of Science and Engineering College Students

This chapter first defines the updated theoretical connotations of aesthetic education and aesthetic literacy in the new era, distinguishing modern comprehensive aesthetic education from traditional vocational-oriented art training. Afterwards, it analyzes unique thinking, cognitive and behavioral traits of science and engineering students, sorting out merits and drawbacks in their aesthetic development to lay a theoretical foundation for subsequent problem diagnosis and path optimization.

2.1. Theoretical Definition of Aesthetic Education and Aesthetic Education Literacy

Contemporary university aesthetic education has transcended the narrow scope of vocational art skill training, evolving into an all-round educational activity that nurtures temperament, inspires intelligence and cultivates morality through aesthetics. Realizing personality enlightenment via the whole process of aesthetic perception, appreciation, experience and creation, aesthetic education is inherently aligned with ideological and political education and indispensable for fostering virtue through education[2]. Different from isolated art tutoring, modern university aesthetic education integrates diversified contents including humanistic aesthetics, technological aesthetics, natural aesthetics and daily-life aesthetics with prominent ideological, practical and immersive attributes.

Aesthetic education literacy refers to comprehensive accomplishments nurtured via systematic aesthetic cultivation, subdivided into four core dimensions: aesthetic perception, artistic appreciation, aesthetic creation and humanistic aesthetic disposition. As external manifestation of personal humanistic accomplishment, it conversely boosts innovative thinking and constitutes an essential competency for the growth of science and engineering undergraduates. Specially, aesthetic education within counselors' educational field denotes daily aesthetic cultivation implemented beyond formal classrooms through heart-to-heart talks, class development, cultural events and social practice, combining disciplinary features of science and engineering to imperceptibly elevate students' aesthetic accomplishment via participatory experience.

2.2. Inherent Thinking and Cognitive Traits of Science and Engineering College Students

From the perspective of logical thinking, long-term mathematical deduction and engineering training equip science and engineering undergraduates with rigorous linear rational thinking, outstanding capabilities in logical reasoning and quantitative analysis yet insufficient divergent thinking. They tend to evaluate everything with pragmatism, lacking associative imagination and empathy, and rarely take initiative to explore aesthetic value embedded in science, nature and daily life.

In terms of learning schedule, core specialized courses, laboratory operations, disciplinary competitions and scientific innovation projects occupy most spare time, objectively squeezing space for aesthetic learning and resulting in fragmented and passive participation in aesthetic activities[3].

Cognitively, utilitarian learning concepts are deeply rooted among students, who equate aesthetic education merely with singing, painting and other performing arts and deem aesthetic training irrelevant to further postgraduate study or career hunting, leading to inadequate internal motivation to access aesthetic resources voluntarily.

2.3. Practical Tendencies in Aesthetic Development of Science and Engineering Students

In daily leisure and aesthetic choices, most science and engineering undergraduates prefer tech-related entertainment and research work, with low participation rates in art galleries, art salons and traditional culture workshops. Their interpersonal communication concentrates on pragmatic exchanges accompanied by deficient emotional and aesthetic expression. When participating in volunteer services and social practice, they prioritize technical assistance and data investigation while overlooking aesthetic resources contained in local folk customs, traditional crafts and rural natural scenery. Overall, their aesthetic development features a typical tendency of "valuing practicality over aesthetics, technology over humanities, passive

indoctrination over active creation”, which serves as core challenges for counselors’ targeted aesthetic guidance.

3. Chapter 2 Practical Difficulties of Aesthetic Education for Science and Engineering Students from Counselors’ Educational Perspective

Built upon foregoing conceptual definition and group characteristic analysis, combined with frontline counselor practice, this chapter sorts out prevailing impediments restricting aesthetic education implementation from three interrelated dimensions: individual student constraints, counselors’ functional deficiencies and institutional and environmental barriers on campus, and explores root causes to support targeted countermeasure formulation.

3.1. Individual Cognitive Barriers: Utilitarian Mentality Undermines Students’ Internal Motivation for Aesthetic Learning

First, misconceptions prevail regarding the value of aesthetic education. Influenced by discipline-oriented training environment, numerous science and engineering students hold a major-only mindset, regarding art festivals and aesthetic salons as time-consuming distractions conflicting with academic study and refusing aesthetic activities subjectively without recognizing aesthetic education’s functions in stimulating innovative thinking and shaping sound personality[4].

Second, insufficient foundational aesthetic knowledge leads to incompetent aesthetic capacity. Uneven allocation of primary and secondary school aesthetic resources plus limited general art class hours in science and engineering universities leave most students without systematic aesthetic training. They struggle to appreciate traditional artwork, modern design or engineering aesthetics, failing to discover aesthetic value within structural design and mechanical modeling of their specialized fields.

Third, student participation in aesthetic activities remains passive and superficial. Most students join campus aesthetic events forced by class registration or comprehensive assessment bonus incentives, acting only as audience instead of independently designing artistic programs or conducting aesthetic creation with immersive experience.

Fourth, abundant aesthetic resources in social practice remain underutilized. During social practice and off-campus volunteer work, students and counselors focus on science popularization and hardware construction without aesthetic-oriented planning, leaving precious rural natural landscapes, intangible cultural heritage and folk humanistic resources unused and the educational value of social practice untapped.

3.2. Deficiencies of Educators: Inadequate Awareness and Literacy Hinder Counselors’ Aesthetic Education Performance

For one thing, aesthetic education is marginalized in counselors’ daily work agenda with weak initiative. Burdened with mandatory work including academic discipline supervision, campus safety management, financial aid and employment guidance, most universities exclude aesthetic education from core assessment indicators for counselors, who consequently regard aesthetic education as exclusive responsibility of professional art teachers and lack willingness to integrate aesthetic cultivation into routine student management.

For another, insufficient professional aesthetic knowledge limits counselors’ instructional capacity. Most recruited counselors graduate from disciplines such as Marxist theory, pedagogy and management with no systematic training in aesthetics, art theory or technological aesthetics. They cannot provide professional suggestions when guiding students on optimizing innovative project design, polishing festival artworks or designing aesthetic-focused social practice.

Besides, existing educational carriers are exploited superficially. Although counselors have access to diversified platforms including art festivals, countryside social practice and campus sports tournaments, events are routinely organized in stereotyped singing and dancing modes lacking discipline-specific technological aesthetic competitions for mathematics, computer and mechanical majors; social practice of “Going to the Countryside” stick to single technical assistance without integrating digital inheritance of intangible heritage or rural aesthetic research, mismatching aesthetic activities with students’ disciplinary advantages.

Furthermore, immersive daily aesthetic education is absent from regular work. Thematic class meetings, dormitory culture construction and individual heart-to-heart communications mostly center on academic pressure, mental health and disciplinary violations, seldom incorporating life aesthetics, technological aesthetics or traditional culture, making daily aesthetic education sporadic and occasional.

3.3. Environmental and Institutional Restrictions: Unfavorable Campus Atmosphere and Imperfect Rules Form External Obstacles

On the environmental side, science and engineering universities prioritize research projects and disciplinary contests in campus construction, with campus layout, events and publicity dominated by innovation themes. Few featured aesthetic programs such as industrial design exhibitions and innovative cultural creation contests are tailored for science and engineering undergraduates, resulting in a lack of subtle aesthetic edification across campus environment.

On the institutional side, backward assessment and incentive systems dampen participation enthusiasm. Current aesthetic education evaluation mainly targets in-class teaching outcomes of professional art instructors, excluding counselors’ aesthetic education achievements and students’ aesthetic practice performance from departmental assessment and undergraduate comprehensive scoring rules. Without bonus or honor incentives for outstanding aesthetic creation and practice projects, neither students nor counselors are motivated to devote themselves to aesthetic education.

Additionally, fragmented collaborative education breaks the linkage among specialized course teachers, art instructors, counselors and parents. Classroom aesthetic teaching, extracurricular aesthetic activities and off-campus practical education operate in isolation with unshared high-quality resources, preventing formation of integrated all-chain educational synergy.

3.4. Summary of Root Causes for Difficulties

Fundamental triggers for the above-mentioned problems fall into three tiers: on the institutional level, delayed top-level design of grassroots aesthetic education and ambiguous division of rights and responsibilities within universities; on the individual student level, utilitarian study habits cultivated by exam-oriented education and specialized science and engineering training suppress internal willingness for aesthetic improvement; on the safeguard level, incomplete incentive, assessment and coordination systems result in insufficient funding and resource support for innovative carrier development, eventually leading to formalized and ineffective aesthetic education implementation.

4. Chapter 3 Systematic Promotion Strategies of Science and Engineering Students’ Aesthetic Literacy Oriented by Counselors’ Educational Work

Corresponding to difficulties in educational conception, counselor competency and institutional environment analyzed above, this chapter proposes targeted, feasible and discipline-adapted promotion systems leveraging counselors’ strengths of close-range, continuous and comprehensive education, eliminating barriers of extracurricular aesthetic

education and facilitating deep integration between aesthetic education, ideological and political instruction, professional learning and social practice.

4.1. Renew Educational Philosophy and Eliminate Students' Utilitarian Aesthetic Prejudice via Ideological Guidance

To correct biased aesthetic values, counselors should first update their own educational mindset and establish an integrated philosophy of "nurturing morality and inspiring intelligence via aesthetics to empower Emerging Engineering Education"[5], incorporating aesthetic cultivation into regular class and grade educational objectives to break the stereotype separating aesthetics from ideology and specialized study.

On one hand, counselors rectify wrong perceptions via themed class meetings, grade assemblies and alumni sharing sessions, citing classic cases of outstanding engineers and industrial designers balancing technical proficiency and aesthetic accomplishment to demonstrate aesthetic value embedded in mathematical formulas, architectural structure and engineering design, dispelling the misconception that aesthetic education is useless for professional innovation and career development.

On the other hand, personalized guidance is delivered through one-on-one talks for students resistant to artistic activities under heavy academic load. Counselors popularize engineering aesthetics matching students' majors starting from their favored mechanical structures or intelligent product design to gradually cultivate aesthetic interest and stimulate spontaneous engagement from within. By embedding aesthetic goals into routine ideological work, counselors realize two-way integration of ideological casting and aesthetic nurturing and complement deficiencies of classroom aesthetic education in value guidance.

4.2. Enrich Campus Cultural and Sports Activities and Build Discipline-based Aesthetic Platforms Centered on University Art Festivals

To improve poor compatibility between existing aesthetic activities and science and engineering characteristics, counselors restructure conventional art festivals and develop customized aesthetic programs for relevant majors.

First, layered mobilization can be conducted to expand coverage of participation. Counselors can mobilize all students via class cadres and student union members extending to dormitories and laboratories, encouraging both artistically gifted undergraduates and ordinary science and engineering learners to participate and end the dominance of liberal arts students in art competitions.

Second, exclusive competition tracks for science and engineering can be set up to achieve the integration of professional studies and aesthetic education. Apart from traditional singing and dancing performances, additional exhibition areas including industrial innovative design, intelligent product creative modeling, architectural model aesthetic design and digital art modeling can be set up[6]. Students are guided to transform curriculum assignments and scientific innovation works into competition entries and perceive technological aesthetics throughout design and production.

Third, full-process follow-up aesthetic guidance can be provided to deepen the effectiveness of aesthetic education. Counselors provide full-process tutoring for participating students by cooperating with professional art teachers to polish works and guide rehearsal and exhibition. Besides, counselors can organize non-participating students to visit exhibitions and attend featured lectures on technological aesthetics for immersive appreciation, transforming art festivals from simple performance galas into all-student aesthetic education platforms.

4.3. Expand Off-campus Educational Space via Countryside-oriented Social Practice

To fully exploit neglected aesthetic resources in social practice, counselors design discipline-specific countryside practice programs combining professional strengths with aesthetic inheritance.

In project planning, students of mathematics help digitize local traditional crafts with 3D modeling; civil engineering undergraduates investigate architectural features of ancient rural buildings; electrical engineering majors optimize lighting and exhibition space for intangible heritage workshops, integrating technical assistance with folk art preservation and rural cultural inheritance.

Field aesthetic guidance is delivered during field trips. The counselor can organize students to document rural natural scenery, vernacular architecture and traditional handicrafts via photography, hand-painted cultural creation and short-video production, converting volunteer service into immersive aesthetic experience.

After fieldwork, counselors organize class-based achievement exhibitions displaying handmade works, investigation albums and documentaries to help students summarize aesthetic gains, upgrading single-purpose volunteer work into composite practical education combining professional service, aesthetic creation and humanistic cultivation[7].

4.4. Build Fragmented Daily Aesthetic Education System Based on Class and Dormitory Construction

Aiming at scattered spare time and insufficient daily aesthetic infiltration, counselors develop lightweight regular aesthetic activities centered on dormitory and class units. In dormitory development, dormitory aesthetic layout contests can be carried out to cultivate daily aesthetic awareness through refined living environment construction. At the class level, short monthly aesthetic-themed seminars can be arranged including classic film appreciation, industrial design review and traditional craft popularization avoiding intensive coursework and experiment periods. Besides, mini offline activities such as campus sketching tours and mutual evaluation of innovative design works can be organized to lower time cost for participation and embed aesthetic education into daily class management and campus life.

4.5. Boost Counselor Self-improvement to Consolidate Professional Capacity for Aesthetic Education

To remedy counselors' insufficient aesthetic expertise, systematic capacity-building measures are formulated for counselor teams. First, counselors actively participate in institutional training covering aesthetic policies, technological aesthetics and integrated ideological-aesthetic education plus open online aesthetic courses to replenish theoretical knowledge and master discipline-targeted aesthetic teaching approaches. Second, counselors accumulate practical experience according to developmental rules of science and engineering undergraduates and refine capabilities in event planning, aesthetic tutoring and practice management. Third, grassroots class aesthetic working groups consisting of art committee members, student club leaders and outstanding innovation participants can be set up to undertake daily small-scale aesthetic events, thus forming a working system with overall coordination from counselors and extensive student participation to ease individual workload.

4.6. Improve Multi-party Collaborative Mechanism and Construct Institutional Safeguards for Integrated Aesthetic Education

To address fragmented coordination and insufficient incentive policies, counselors promote institutional optimization inside and outside campus. For internal motivation, counselors facilitate revisions of comprehensive assessment regulations to reward students participating

in festival contests, countryside aesthetic practice and original artwork creation with bonus points and exclusive honors such as Excellent Aesthetic Individual and Outstanding Practical Aesthetic Team. For in-campus collaboration, regular communication channels linking specialized teachers, art instructors and counselors can be built. Professional teachers explore aesthetic materials in classroom teaching, art tutors offer specialized artistic guidance and counselors promote off-campus practical implementation to connect in-class and after-class aesthetic education seamlessly. For off-campus linkage, multi-party coordination can be implemented by cooperating with local museums, intangible heritage workshops, rural research bases and cultural and creative industrial parks for field visits and practical learning. Meanwhile, the counselor can popularize the importance of aesthetic education among parents via home-school communication platforms to realize three-dimensional collaborative education spanning campus, society and family.

5. Conclusion

Amid nationwide implementation of five-aspect comprehensive education and accelerated cultivation of Emerging Engineering talents, aesthetic education becomes indispensable for optimizing training frameworks and fostering well-rounded science and engineering graduates. With unparalleled proximity to students and deep engagement in daily management, university counselors constitute core forces filling the gap of extracurricular aesthetic education for science and engineering majors. Starting from counselors' educational field, this paper defines core aesthetic theories, analyzes rational-oriented thinking and utilitarian aesthetic cognition among target students, diagnoses major obstacles across individual, counselor and institutional levels, and puts forward six sets of operable countermeasures concerning educational philosophy, campus events, social practice, daily immersion, team construction and collaborative systems. By closely integrating art festivals, countryside social practice and class-dormitory management with aesthetic cultivation, the research breaks geographical restrictions of classroom-only aesthetic education.

Improving aesthetic literacy for science and engineering undergraduates constitutes a long-term progressive educational project which is impossible to accomplish via sporadic short-term activities. Counselors ought to abandon administrative mindset, assume due aesthetic education responsibilities and continuously tap aesthetic resources embedded in diversified student work to deepen integration of aesthetic education with ideological instruction, specialized learning and social practice. Given varied educational resources and faculty conditions across different types of science and engineering universities, follow-up researches can refine customized implementation schemes matching institutional characteristics and continuously polish counselor-based aesthetic education paths, ultimately realizing coordinated development of professional competence and humanistic aesthetics for engineering undergraduates and consolidating aesthetic foundation for interdisciplinary innovative talent cultivation in the new era.

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