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EVALUATING THE NANYING VOCAL TRAINING METHOD IN UNDERGRADUATE POPULAR MUSIC EDUCATION: A MIXED-METHODS QUASI-EXPERIMENTAL STUDY

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ABSTRACT

The growing technical demands of contemporary commercial music (CCM) have exposed limitations in traditional vocal pedagogy within higher music education, particularly regarding vocal health, register transition, and stylistic adaptability. This study evaluates the effectiveness of the Nanying Vocal Training Method (NYVTM), an integrated pedagogical framework combining principles from Estill Voice Training (EVT), Speech Level Singing (SLS), and the Institute for Vocal Advancement (IVA). A 15-week quasi-experimental intervention was conducted with twenty undergraduate vocal majors (n = 20) at the Xinghai Conservatory of Music. A mixed-methods design was adopted, incorporating pretest–posttest performance measures, paired-sample t-tests, and semi-structured interviews. Statistically significant improvements were observed across key performance indicators (p < .001). Vocal range expanded from an average of 1.5 to 2.2 octaves, maximum phonation time increased from 12 to 20 seconds, and instructor-rated resonance quality and stage presence demonstrated marked enhancement. Qualitative findings further indicated increased technical confidence and reduced performance anxiety among participants. The findings suggest that an integrated physiological approach may enhance technical development and performance stability in undergraduate CCM training. While limited by sample size and the absence of a control group, this study provides preliminary empirical support for structured integration of EVT, SLS, and IVA principles within Chinese higher music education contexts.

KEYWORDS: *Contemporary Commercial Music; Vocal Pedagogy; Mixed-Methods Research; Vocal Health; Higher Music Education*

1 INTRODUCTION

Contemporary commercial music (CCM) requires vocalists to demonstrate technical flexibility, extended range, stylistic adaptability, and sustained vocal endurance (Morawska et al., 2024). Unlike traditional classical training models, CCM performance frequently involves rapid register transitions, intensified upper-register production, belt-dominant timbres, and dynamic tonal modifications across genres such as pop, R&B, and musical theatre (de Villiers & Gillmer, 2024). These stylistic characteristics demand refined coordination of vocal fold configuration, subglottic pressure regulation, and supraglottic resonance shaping. For undergraduate vocal students who are still establishing foundational motor patterns and physiological stability, such demands often exceed their current technical capacity, increasing the likelihood of compensatory tension, inefficient phonation, and vocal fatigue (Ye, 2026).

Within Chinese higher music education, popular vocal programs have expanded substantially in response to cultural industry growth and the diversification of musical consumption (Xiao, 2025). However, pedagogical practices in many conservatories remain historically influenced by classical vocal paradigms, where tonal uniformity and resonance projection are prioritized over stylistic flexibility and register blending (Lijing & Sartjinpong, 2025). Consequently, undergraduate CCM students frequently encounter persistent technical challenges, including instability in breath management, strain during passaggio negotiation, limited resonance modulation across stylistic contexts, and reduced endurance during high-intensity repertoire. In addition to these physiological constraints, psychological factors—particularly performance anxiety associated with upper-register singing and belting—further impede technical consolidation (Maoqing, 2025). When vocal production lacks biomechanical reliability, students often experience decreased confidence, which may reinforce maladaptive muscular patterns and hinder artistic expression.

In response to these challenges, Western pedagogical systems such as Estill Voice Training (EVT) and Speech Level Singing (SLS) have offered anatomically informed frameworks grounded in contemporary voice science (Accetta, 2022; Zeshan & Thanawat, 2025). EVT emphasizes structural independence within the Source–Filter model, enabling singers to cultivate conscious control over discrete laryngeal and supraglottic adjustments, thereby transforming abstract vocal imagery into measurable physiological action (Steinhauer, 2023). SLS, by contrast, prioritizes laryngeal neutrality and coordinated air-to-cord balance, with the aim of facilitating seamless register transitions and minimizing extrinsic muscular tension (Gürel & Şakalar, 2025). Complementing these approaches, the Institute for Vocal Advancement (IVA) introduces structured diagnostic procedures and individualized corrective sequencing, integrating technical training with vocal health management and preventative conditioning (Jander et al., 2025). Collectively, these systems contribute valuable insights into contemporary CCM pedagogy. Nevertheless, existing scholarship has largely examined them independently, and empirical research evaluating their systematic integration within semester-length undergraduate programs—particularly in Chinese conservatory contexts—remains limited.

Furthermore, few studies have adopted mixed-methods research designs to examine both objective physiological improvements and subjective learner perceptions within integrated vocal interventions. The absence of such context-specific empirical validation reveals a gap between vocal science theory and pedagogical implementation. Addressing this gap requires a structured instructional model that not only synthesizes anatomical precision and functional balance but also evaluates measurable performance outcomes within authentic educational settings.

To address these issues, the present study proposes and evaluates the Nanying Vocal Training Method (NYVTM), a structured pedagogical framework synthesizing principles from EVT, SLS, and IVA within an undergraduate CCM curriculum. The study is guided by three research objectives:

RO1: To investigate the specific pedagogical challenges and training needs of undergraduate students in popular music vocal programs.

RO2: To develop the Nanying Vocal Training Method as a systematic instructional innovation that integrates contemporary vocal science within higher music education.

RO3: To evaluate the effectiveness of this integrated method in improving vocal range, breath control, and artistic expression, and to explore potential mechanisms underlying vocal skill optimization.

2. LITERATURE REVIEW

Contemporary commercial music (CCM) presents distinctive physiological, acoustic, and stylistic demands that differentiate it from traditional classical vocal paradigms (London et al., 2025).

Unlike operatic production, which emphasizes consistent tonal uniformity and resonance stability, CCM frequently requires intensified upper-register phonation, belt-dominant timbres, rapid dynamic shifts, and flexible stylistic modulation across genres such as pop, R&B, and musical theatre (von Germeten, 2023). These performance requirements necessitate precise coordination between vocal fold configuration, subglottic pressure management, and supraglottic resonance shaping. Recent advances in vocal science have increasingly highlighted the biomechanical underpinnings of efficient phonation, particularly in relation to vocal fold adduction patterns, laryngeal positioning, and the interaction between respiratory support and acoustic output (Thomson, 2024). However, while physiological research has expanded substantially, its pedagogical translation into structured undergraduate conservatory training remains uneven. In many higher education contexts, especially those historically rooted in classical technique, instructional approaches continue to rely on metaphorical imagery rather than anatomically informed guidance (Sansom, 2025). Consequently, undergraduate CCM students frequently exhibit persistent passaggio instability, compensatory muscular tension, vocal fatigue, and performance-related anxiety during technically demanding repertoire (Maoqing, 2025).

Among contemporary pedagogical systems, Estill Voice Training (EVT) has emerged as a highly detailed anatomical framework grounded in the Source–Filter model of voice production (Grillo et al., 2024). By distinguishing between sound generation at the level of the vocal folds and sound modification within the vocal tract, EVT enables singers to cultivate conscious control over specific structural adjustments, including cricothyroid tilt, ventricular fold retraction, and aryepiglottic narrowing (Steinhauer, 2023). This structural independence provides a mechanical foundation for executing high-intensity phonation, including belting, with reduced reliance on excessive extrinsic tension. Complementing EVT's anatomical precision, Speech Level Singing (SLS) emphasizes functional balance through laryngeal neutrality and coordinated air-to-cord interaction, with the pedagogical objective of eliminating audible register breaks (Gürel & Şakalar, 2025). Techniques such as semi-occluded vocal tract exercises and lip trills are widely used to facilitate smoother passaggio negotiation and improve phonatory efficiency (Pozzali et al., 2024). Meanwhile, the Institute for Vocal Advancement (IVA) extends these physiological principles through a diagnostic and sequential training model that prioritizes individualized correction and long-term vocal sustainability (Nusseck et al., 2021). Despite their conceptual strengths, these approaches are often implemented independently, and empirical research evaluating their systematic integration within semester-length undergraduate curricula remains limited. Moreover, much of the existing literature is practitioner-oriented rather than based on controlled educational intervention (Li et al., 2025; Rodwin et al., 2022).

The need for integrative validation is particularly salient within Chinese higher music education, where popular vocal instruction has expanded rapidly but remains influenced by classical pedagogical traditions (Lu & Salleh, 2025). While Western CCM methodologies are increasingly introduced into conservatory programs, few studies have empirically examined how their structured integration affects measurable performance outcomes and student-reported technical confidence within this localized context (Sternberg et al., 2022). In addition, limited research has employed mixed-methods designs to investigate both physiological improvements and psychological adaptations resulting from coordinated vocal interventions (McGlashan et al., 2023; Perry et al., 2024). The absence of such context-specific empirical evidence highlights a critical gap between vocal science theory and pedagogical implementation. The present study seeks to address this gap by evaluating the Nanying Vocal Training Method (NYVTM), a structured framework synthesizing EVT, SLS, and IVA principles, and by examining its effectiveness in enhancing vocal range, breath control, resonance stability, and artistic performance among undergraduate CCM students.

3. METHODOLOGY

3.1 Research Design and Overall Framework

This study adopted a mixed-methods design combining needs analysis, expert validation, and quasi-experimental intervention to evaluate the development and effectiveness of the Nanying Vocal Training Method (NYVTM) (Donahue, 2025). The methodological structure corresponded directly to the three research objectives: (1) identification of student needs, (2) construction and validation of the instructional framework, and (3) empirical evaluation of performance outcomes.

A pretest–posttest quasi-experimental design without a control group was implemented over a 15-week academic semester. Quantitative performance indicators were triangulated with qualitative interview data to enhance explanatory validity.

3.2 Needs Analysis of Undergraduate Students

To investigate Research Objective 1 (RO1), a structured survey was administered to 20 first-year undergraduate students enrolled in the Popular Music Vocal program. The survey examined perceived technical challenges and training priorities, serving as a diagnostic baseline prior to curriculum design and intervention implementation. The instrument was constructed to cover core competency domains frequently emphasized in contemporary CCM training, including physiological technique development (range extension and pitch stability), vocal health awareness (injury prevention and fatigue management), and performance artistry (emotional communication and stage embodiment). To enhance clarity and feasibility for first-year participants, items were presented in a concise Yes/No format for priority identification, accompanied by a genre-preference item to capture stylistic orientation. The survey was administered during the initial stage of the study (before any NYVTM instruction), ensuring that responses reflected students' pre-intervention perceptions rather than post-training evaluation effects. Responses were collated and summarized using descriptive statistics (frequency counts and percentages), with results presented in Table 1

Table 1 Survey on Training Needs of Undergraduate Vocal Students (n = 20)

Item	Yes (n)	Yes (%)
Expand vocal range	20	100%
Improve pitch control	20	100%
Learn vocal cord protection techniques	20	100%
Improve emotional expression	20	100%
Improve stage performance	20	100%

Additionally, genre preference analysis revealed:

R&B: 50%

Jazz: 30%

Other: 20%

Rock: 0%

The results demonstrate unanimous agreement across all five training priorities, indicating that this cohort perceived multidimensional developmental insufficiency rather than isolated weaknesses. The unanimous demand for range expansion and pitch accuracy suggests that physiological coordination—particularly in upper-register access and register transition—was widely experienced as unstable or unreliable among participants. In parallel, the universal interest in vocal cord protection techniques reflects strong perceived need for systematic vocal health management, which is frequently associated with issues such as fatigue accumulation, tension-driven compensatory habits, and inefficient breath–phonation coordination in early-stage CCM learners. Notably, the fact that all students also prioritized emotional expression and stage performance improvement implies that perceived deficiencies were not limited to "technical execution," but extended to the integration of technique with expressive embodiment—an area often underdeveloped when pedagogy emphasizes sound production without structured performance translation.

Genre preference distribution provides further contextual interpretation of these needs. The predominance of R&B and jazz suggests that students were oriented toward styles requiring fine-grained pitch control, agile melodic ornamentation, nuanced timbral adjustment, and dynamic phrasing, which may intensify the perceived urgency for stable breath management, register consistency, and expressive delivery. Conversely, the absence of rock preference in this cohort implies that the training priorities identified here are less driven by stylistic demands for high-intensity power production and more aligned with precision-based, groove-oriented vocal performance, strengthening the rationale for an approach that emphasizes functional balance, efficiency, and controllable resonance variation.

Survey findings were further supported by key informant interviews, which were conducted to triangulate student self-reports with expert pedagogical observation and to strengthen construct validity prior to intervention. Across interviews, informants repeatedly identified practical teaching challenges consistent with the survey results, including breath management inefficiency, elevated muscular tension during pitch ascent, and register inconsistency—particularly in the passaggio region—alongside difficulties transferring technical drills into emotionally convincing and physically embodied performance behaviors. The convergence between student-reported needs and instructor-reported patterns indicates that the diagnostic phase captured stable and instruction-relevant constructs rather than temporary preferences.

Collectively, this needs analysis directly informed the structural components of the NYVTM curriculum. The unanimous emphasis on range expansion and pitch control supported the prioritization of register-bridging strategies and coordinated breath–phonation training. The vocal protection priority justified embedding vocal health protocols (e.g., fatigue

monitoring principles and preventive conditioning routines) as a core curriculum element rather than an auxiliary topic. Finally, the universal demand for emotional and stage performance improvement motivated the curriculum's deliberate integration of technical acquisition with expressive and performative application, ensuring that physiological stability could function as a scaffold for artistic communication. In this way, the needs analysis functioned not only as a descriptive survey, but as an evidence-informed diagnostic foundation that guided curriculum targeting and strengthened methodological coherence between the assessment phase and subsequent intervention design.

3.3 Expert Validation of the Instructional Framework

Before implementation, the NYVTM instructional structure underwent a formal content validation process to ensure alignment between its pedagogical components and the stated learning objectives. Three senior vocal experts with extensive experience in higher music education and contemporary vocal pedagogy were invited to evaluate the instructional framework. All experts possessed more than ten years of teaching experience and were familiar with physiological-based vocal training approaches, ensuring informed and discipline-relevant judgment.

Content validity was assessed using the Index of Item–Objective Congruence (IOC), a commonly employed method for evaluating the degree of correspondence between instructional items and intended objectives. Each instructional component was independently rated by the experts on a three-point scale: +1 (clearly congruent), 0 (uncertain), and −1 (not congruent). IOC values were calculated by averaging the expert ratings for each item. A threshold of 0.50 was adopted as the minimum acceptable level of content validity, in accordance with established validation conventions.Table 2 presents the detailed IOC results.

Table 2 IOC Evaluation of NYVTM Instructional Components

Item No.	Expert 1	Expert 2	Expert 3	IOC
1	1	1	0	0.67
2	0	1	1	0.67
3	0	1	1	0.67
4	1	1	1	1
5	1	1	1	1
6	1	0	1	0.67
7	1	1	1	1
8	1	-1	1	0.33
9	1	1	1	1
10	1	1	0	0.67
Overall IOC Score = 0.77				

The overall IOC value of 0.77 indicates satisfactory to strong content validity for the instructional framework as a whole. Most items exceeded the acceptable threshold of 0.50, demonstrating consistent expert agreement regarding alignment between instructional design and stated objectives. Items 4, 5, 7, and 9 achieved perfect agreement (IOC = 1.00), suggesting particularly clear conceptual and operational coherence.Item 8 yielded an IOC value of 0.33, reflecting disagreement among evaluators. Expert feedback indicated that the wording of this instructional component lacked sufficient specificity in linking theoretical principles to observable learning outcomes. Prior to implementation, the item was revised to clarify procedural sequencing and explicitly state measurable performance indicators. The revised version was subsequently reviewed to ensure improved objective congruence before being incorporated into the final instructional plan.

This validation procedure strengthened the internal coherence of the NYVTM design by systematically aligning theoretical constructs with operational teaching components. By conducting expert-based content verification prior to intervention, the study enhanced methodological rigor and reduced potential construct ambiguity during the implementation phase.

3.4 Experimental Intervention Procedure

Following needs identification and expert validation, a 15-week NYVTM intervention was conducted with 20 undergraduate participants. The intervention was implemented within the existing institutional timetable to preserve ecological validity and ensure that instructional conditions reflected authentic conservatory teaching practice rather than laboratory simulation. All sessions were delivered by the researcher as primary instructor, ensuring procedural consistency throughout the intervention period.The curriculum was systematically structured into three progressive phases, each building upon the physiological and technical foundations established in the previous stage.

1. Physiological Awareness Phase

The initial phase emphasized foundational physiological coordination. Instruction focused on breath–phonation synchronization, laryngeal positioning awareness, and controlled airflow regulation. Semi-occluded vocal tract (SOVT) exercises—including lip trills and straw phonation—were introduced to enhance vocal fold efficiency and reduce excessive subglottic pressure. Particular

attention was given to minimizing extrinsic muscular tension and developing proprioceptive awareness of vocal tract adjustments. This phase aimed to stabilize baseline vocal function and establish efficient motor patterns prior to register-specific training.

2. Register Integration Phase

The second phase concentrated on register unification and passaggio stabilization. Exercises were designed to promote smooth transition between chest-dominant and head-dominant configurations through controlled vowel modification, laryngeal neutrality, and resonance rebalancing. Dynamic control tasks were introduced to develop gradual intensity modulation without compromising tonal stability. Students engaged in guided drills targeting upper-register access while maintaining breath efficiency and minimizing compensatory constriction. This phase emphasized functional balance as a prerequisite for stylistic flexibility in contemporary repertoire.

3. Performance Integration Phase

The final phase extended technical control into applied repertoire contexts. Students applied previously acquired physiological and register-management skills to selected songs aligned with their stylistic preferences. Instruction incorporated emotional phrasing strategies, onset variation techniques, and coordinated body–voice integration for stage embodiment. Simulated performance sessions were conducted to replicate authentic stage conditions, allowing students to practice technical execution under mild performance pressure. Feedback during this phase addressed both acoustic precision and expressive coherence.

Throughout all phases, instruction incorporated principles derived from Estill Voice Training (EVT), Speech Level Singing (SLS), and the Institute for Vocal Advancement (IVA). EVT principles informed anatomical isolation and resonance shaping tasks; SLS concepts guided laryngeal neutrality and register blending; IVA frameworks structured individualized diagnostic sequencing and corrective progression. Rather than applying these systems independently, the intervention integrated them within a coherent pedagogical progression aligned with the diagnosed needs of the cohort.

Weekly lesson modules included individualized technical assessment, targeted corrective sequencing, structured peer observation sessions, and performance simulations. Individualized assessment allowed for adaptation of exercise intensity according to each student's vocal profile, while peer review sessions encouraged reflective learning and observational skill development. This blended instructional format ensured that physiological stabilization, technical refinement, and expressive embodiment were developed concurrently over the 15-week period.

3.5 Performance Measurement and Data Analysis

Pretest and post-test assessments were conducted to evaluate five key performance dimensions: Vocal Range (measured in octaves), Breath Control (Maximum Phonation Time, seconds), Resonance Quality (5-point instructor rating), Emotional Expression (5-point instructor rating), and Stage Presence (5-point instructor rating). These measures were selected to capture both physiological and expressive aspects of undergraduate vocal performance.Baseline (pretest) results are presented in Table 3.

Table 3 Pre-test Baseline Performance Scores (n = 20)

Performance Dimension	Mean (M)
Vocal Range (Octaves)	1.5
Breath Control (MPT, sec)	12
Resonance Quality (1–5)	3.1
Emotional Expression (1–5)	2.8
Stage Presence (1–5)	2.5

The baseline data indicate moderate technical development with comparatively lower ratings in expressive and stage-related domains, suggesting an imbalance between physiological control and performance embodiment prior to intervention.

Post-intervention differences were analyzed using paired-sample t-tests to examine within-group changes over the 15-week period. Statistical significance was established at $p < .05$. In addition to significance testing, percentage growth was calculated to illustrate relative magnitude of improvement across performance domains.Post-intervention comparisons were analyzed using paired-sample t-tests. Statistical significance was set at $p < .05$, with effect magnitude interpreted via percentage growth.

Table 4 Pre-test and Post-test Comparison (n = 20)

Performance Dimension	Pre-test	Post-test	Growth (%)	t-value	p
Vocal Range	1.5	2.2	46.60%	12.45	< .001
Breath Control	12	20	66.70%	15.32	< .001
Resonance Quality	3.1	4.2	35.40%	9.87	< .001
Emotional Expression	2.8	4.1	46.40%	10.12	< .001
Stage Presence	2.5	4	60.00%	11.05	< .001

All five performance dimensions demonstrated statistically significant improvement at $p < .001$, indicating robust within-subject gains across physiological and expressive measures. Among the variables, Breath Control exhibited the largest relative increase (66.7%), reflecting substantial enhancement in sustained phonation capacity and respiratory–phonatory coordination. The observed expansion in Vocal Range (46.6%) suggests improved register negotiation and increased upper-register accessibility.Improvements in Stage Presence (60%) and Emotional Expression (46.4%) indicate not only technical stabilization but also enhanced expressive embodiment. While the present design does not allow for causal attribution beyond the intervention context, the magnitude of change across both physiological and performance domains suggests that improved technical efficiency may have facilitated greater psychological confidence and stage engagement.

Resonance Quality demonstrated steady growth (35.4%), reflecting increased control over tonal shaping and projection consistency as evaluated by instructor ratings. The relatively balanced improvement pattern across all domains supports the integrative structure of the NYVTM, which intentionally combined physiological stabilization, register integration, and applied performance practice.Qualitative interview data further corroborated these quantitative findings. Participants reported reduced vocal fatigue during extended singing, increased stability in high-register passages, and greater confidence in stage delivery. Several students noted that improved technical clarity diminished anxiety related to pitch insecurity, thereby enhancing overall performance presence. The convergence of statistical outcomes and interview data strengthens the internal consistency of the intervention results.

3.6 Intervention Framework (NYVTM)

The Nanying Vocal Training Method (NYVTM) was developed as an integrative pedagogical framework designed to address the physiological instability and technical fragmentation frequently observed among undergraduate students in contemporary commercial music (CCM) programs. Rather than adhering to a single theoretical paradigm, the NYVTM synthesizes core principles from Estill Voice Training (EVT), Speech Level Singing (SLS), and the Institute for Vocal Advancement (IVA), forming a structured model that unifies anatomical precision, functional balance, and individualized diagnostic sequencing within a coherent instructional system.

At the structural level, EVT provides the anatomical foundation of the framework. Drawing upon the Source–Filter theory of voice production, students are guided to differentiate between sound generation at the level of the vocal folds and acoustic shaping within the vocal tract. Through the cultivation of awareness regarding specific laryngeal adjustments—such as calibrated cricothyroid engagement and controlled supraglottic narrowing—students acquire measurable control over vocal intensity, spectral brightness, and timbral variation. This emphasis on anatomical differentiation minimizes compensatory constriction and enhances biomechanical efficiency, particularly during high-intensity phonation.

From a functional perspective, SLS contributes the principle of laryngeal neutrality and balanced air-to-cord coordination. By regulating subglottic pressure and maintaining consistent vocal fold closure patterns, smoother register transitions can be achieved, especially across the passaggio. Such balance is critical for the development of a stable mixed-voice configuration, which underpins stylistic flexibility in CCM performance contexts. In this way, SLS principles reinforce the dynamic equilibrium necessary for sustained vocal efficiency across varying pitch and intensity demands.

Operationally, IVA introduces a diagnostic logic that supports individualized progression. Instead of prescribing uniform exercise routines, the NYVTM incorporates systematic assessment and targeted corrective sequencing to preserve vocal equilibrium and optimize functional alignment. This diagnostic orientation strengthens proprioceptive awareness and encourages self-monitoring strategies, thereby supporting long-term vocal sustainability beyond the instructional setting.

The operationalization of the NYVTM unfolds across three interrelated dimensions: (1) physiological mechanics and technical proficiency, (2) vocal health and fatigue management, and (3) expressive embodiment and stage integration. Technical drills emphasize breath coordination, register blending, and resonance modulation, while preventative strategies—such as semi-occluded vocal tract exercises—are embedded to reduce phonatory threshold pressure and facilitate recovery. Expressive training further integrates vocal coloration with kinesthetic alignment, ensuring that artistic communication is grounded in physiological stability rather than tension-driven compensation.

4. RESULTS AND ANALYSIS

4.1 Quantitative Analysis of Vocal Performance

To evaluate the effectiveness of the Nanying Vocal Training Method (NYVTM), paired-sample t-tests

were conducted to compare pre-test and post-test scores across five performance dimensions: vocal range, breath control, resonance quality, emotional expression, and stage presence.Table 5 presents the comparative results of pre-test and post-test performance scores, including percentage growth, t-values, and significance levels.

Table 5 Pre-test and Post-test Comparison of Vocal Performance (n = 20)

Performance Dimension	Pre-test Mean	Post-test Mean	Growth (%)	t-value	p-value
Vocal Range (Octaves)	1.5	2.2	46.60%	12.45	< .001
Breath Control (MPT, sec)	12	20	66.70%	15.32	< .001
Resonance Quality (1–5)	3.1	4.2	35.40%	9.87	< .001
Emotional Expression (1–5)	2.8	4.1	46.40%	10.12	< .001
Stage Presence (1–5)	2.5	4	60.00%	11.05	< .001

All five domains demonstrated statistically significant improvement at $p < .001$, indicating consistent within-group gains across both physiological and expressive performance measures. The magnitude of the t-values further reflects substantial differentiation between pre- and post-intervention scores.

The largest proportional improvement was observed in breath control (66.7%), as indexed by Maximum Phonation Time (MPT). This increase suggests enhanced respiratory–phonatory coordination and improved regulation of subglottic pressure. From a biomechanical standpoint, extended phonation duration is typically associated with more efficient glottal closure patterns and reduced air leakage, outcomes consistent with structured breath training and the incorporation of semi-occluded vocal tract exercises within the intervention.Vocal range expanded by 46.6%, increasing from 1.5 to 2.2 octaves. This expansion may reflect improved register integration and decreased laryngeal constriction during pitch ascent. The coordinated application of EVT-informed structural differentiation and SLS-derived laryngeal neutrality likely supported smoother passaggio negotiation and more stable upper-register production.Resonance quality improved by 35.4%, indicating enhanced control over vocal tract shaping and greater consistency in tonal projection. Such improvement suggests increased awareness and management of supraglottic adjustments, enabling stylistically appropriate timbral modulation without reliance on tension-based compensatory strategies.Emotional expression and stage presence increased by 46.4% and 60%, respectively. The pronounced gain in stage presence is particularly noteworthy. While causality cannot be definitively inferred within a single-group design, it is plausible that improved physiological stability reduced performance-related cognitive load, thereby enabling greater expressive engagement and audience-oriented communication.

Collectively, these findings indicate that the NYVTM intervention was associated with multidimensional improvement spanning biomechanical efficiency, acoustic control, and performance embodiment. The parallel enhancement of technical and expressive domains supports the integrative structure of the training model and suggests functional interdependence between physiological regulation and artistic performance outcomes.

4.2 Effect Magnitude and Practical Significance

Beyond statistical significance, the magnitude and consistency of improvement across performance domains indicate meaningful pedagogical relevance. The uniformly high t-values suggest substantial pre–post differentiation, particularly in breath control and vocal range, which exhibited the largest proportional gains. Although formal effect size coefficients were not computed in the present analysis, the scale of observed changes—combined with consistent significance at $p < .001$—points toward practically meaningful instructional impact rather than marginal statistical fluctuation.

Importantly, improvement was observed concurrently in both technical domains (vocal range, breath control, resonance quality) and expressive domains (emotional expression and stage presence). This parallel development suggests that the intervention was associated not merely with isolated skill enhancement, but with broader functional consolidation across physiological and performative dimensions.Such systemic progression is consistent with the integrative logic underlying the NYVTM framework. Within this model, structural control (anatomical precision) supports functional balance (efficient register coordination and breath management), which may, in turn, reduce performance-related cognitive and physiological strain. The stabilization of underlying biomechanical processes plausibly creates conditions conducive to more confident and expressive artistic communication.

Taken together, the magnitude and multidimensional distribution of improvement support the pedagogical coherence of the tri-phasic

integration model, indicating that technical stabilization and expressive development may operate as interdependent rather than discrete components of undergraduate CCM training.

4.3 Qualitative Findings and Thematic Analysis

To further explore potential internal transmission mechanisms underlying the observed performance gains, post-intervention semi-structured interviews were conducted with participating students. A thematic analysis of interview transcripts identified four dominant categories: (1) increased physiological awareness, (2) reduced vocal fatigue, (3) enhanced register stability, and (4) increased performance confidence.

Participants consistently described heightened sensitivity to breath coordination and laryngeal positioning, indicating greater awareness of the mechanical processes involved in sound production. Many reported that high-register notes felt "lighter" and "less strained" compared to their pre-intervention experiences. Several students noted that structured breath-coordination exercises reduced perceived throat tension and enabled sustained phrases without discomfort. Others indicated that improved technical reliability contributed to decreased anticipatory anxiety prior to performance tasks.

A recurring theme across interviews was the perception that "control replaced fear," particularly during upper-register passages that had previously been associated with instability. This shift in perception suggests that improved biomechanical reliability may have functioned not only as a technical enhancement but also as a psychological stabilizing factor. While qualitative findings cannot establish causal mechanisms definitively, the convergence of reported physiological stability and increased performance confidence supports the interpretation that technical consistency and emotional assurance may be functionally interconnected within the NYVTM framework.

4.4 Integrated Interpretation: Physiological–Psychological Coupling

To further explore potential internal transmission mechanisms underlying the observed performance gains, post-intervention semi-structured interviews were conducted with participating students. A thematic analysis of interview transcripts identified four dominant categories: (1) increased physiological awareness, (2) reduced vocal fatigue, (3) enhanced register stability, and (4) increased performance confidence.

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5. DISCUSSION

5.1 Research Findings

The findings of this study provide empirical evidence supporting the instructional relevance of the Nanying Vocal Training Method (NYVTM) for undergraduate popular music students in contemporary commercial music (CCM) programs. Consistent pre–post improvements were observed across technical, physiological, and expressive domains, suggesting that an integrative training design can promote coordinated development rather than isolated skill gains.

In the technical domain, vocal range increased from 1.5 to 2.2 octaves, indicating improved upper-register accessibility and greater continuity across registers. Pedagogically, this change implies that students could negotiate pitch ascent with fewer disruptions and expand repertoire feasibility. This outcome aligns with NYVTM's incorporation of Speech Level Singing (SLS) principles—particularly laryngeal neutrality and balanced air-to-cord coordination—which are commonly associated with smoother passaggio negotiation and more stable mixed-voice functioning in CCM training.

Breath control showed the largest proportional gain, with Maximum Phonation Time (MPT)

increasing from 12 to 20 seconds. This improvement suggests strengthened respiratory–phonatory coordination and may translate into more stable phrase sustainment, reduced urgency for breath renewal, and greater control over dynamic shaping. Within the NYVTM framework, the structured use of semi-occluded vocal tract (SOVT) tasks and breath-coordination drills likely supported more efficient subglottic pressure regulation and reduced air leakage during phonation. Complementing this, Estill Voice Training (EVT)–informed anatomical framing may have enhanced students' procedural understanding of "support" by linking sensation to controllable mechanisms (source–filter coordination), potentially reducing reliance on vague imagery that novice singers often misapply.Resonance quality also improved, suggesting more consistent vocal tract shaping and tonal projection. Although resonance was evaluated through instructor ratings, the direction and magnitude of change are consistent with increased control over supraglottic adjustments and resonance balancing. This is pedagogically significant in CCM contexts where timbral demands shift across styles; improved resonance control can enable stylistic coloration while reducing tension-driven compensatory strategies.

Importantly, gains extended beyond biomechanics. Emotional expression and stage presence improved substantially, indicating that technical stabilization may have supported broader performance embodiment. Qualitative interview themes—reduced vocal fatigue, increased high-register stability, and heightened confidence—converged with quantitative outcomes, offering a plausible interpretive link between physiological reliability and psychological readiness. Participants' repeated descriptions of high notes feeling "lighter" and "less strained," along with the theme of "control replacing fear," suggest that greater technical predictability may reduce anticipatory anxiety and free attentional resources for interpretation, audience connection, and embodied delivery. While causality cannot be established within a single-group design, this convergence supports the view that physiological regulation and expressive engagement may operate as interdependent components of CCM performance development.Collectively, the distribution of gains is consistent with the internal logic of the NYVTM tri-phasic model: physiological awareness establishes baseline efficiency, register integration consolidates continuity across the passaggio, and performance integration transfers technical control into repertoire-based artistry. In curricular terms, the results suggest that expressive growth may be more effectively cultivated when technical training is explicitly sequenced toward performance transfer rather than confined to decontextualized drills.

Several limitations should be noted. The sample was small (n = 20), the study was conducted in a single institution, and the absence of a control group limits generalizability and the ability to rule out maturation or concurrent learning effects. In addition, some outcomes relied on instructor ratings, which are appropriate for performance assessment but introduce subjectivity. Future research should employ larger multi-site samples, incorporate follow-up measurements to examine retention, and include additional objective or blinded assessment procedures where feasible, particularly to evaluate durability of register stability, breath efficiency, and expressive transfer across diverse CCM sub-genres.

5.2 Theoretical Contributions

This study contributes to contemporary commercial music (CCM) pedagogy by proposing and empirically examining an integrative, operationalized instructional framework grounded in vocal science yet situated within higher education practice. In contrast to recent trends that prioritize isolated acoustic phenomena or narrowly defined rehabilitation protocols (Mohmmad & Sanampudi, 2024; Ross et al., 2023), the Nanying Vocal Training Method (NYVTM) advances a systems-oriented pedagogical model that links anatomical precision, functional coordination, and curricular sequencing.

First, the NYVTM offers a response to the increasingly reductionist orientation of vocal science research. Since 2019, a considerable body of scholarship has focused on high-resolution imaging, laryngeal biomechanics, and micro-level muscular adjustments—particularly in the study of belting and high-intensity phonation (Martínez et al., 2025; Rudisch et al., 2025). While these investigations have significantly refined anatomical understanding, their translation into studio pedagogy has often remained implicit. The NYVTM contributes a translational framework by operationalizing physiological constructs—such as source–filter differentiation and laryngeal adjustment—within a structured teaching progression. Through the integration of EVT-informed anatomical differentiation ("structural control") and SLS-derived functional continuity ("dynamic balance"), the study demonstrates how biomechanical concepts can be embedded within artistic training rather than confined to laboratory discourse. In doing so, it contributes to narrowing the

theoretical divide between voice science and applied vocal artistry.

Second, the study addresses a recognized gap in cross-cultural CCM pedagogy. Although Western CCM methods are well documented, empirical investigations of their adaptation within East Asian conservatory contexts remain comparatively limited. Much existing literature assumes linguistic and phonatory baselines derived from Indo-European languages (Hiovain et al., 2020), with limited attention to tonal language environments and their potential influence on habitual laryngeal behavior. By examining a Western-integrated framework (EVT, SLS, IVA) within a Chinese undergraduate cohort, this research contributes context-sensitive evidence regarding the adaptability of physiological principles across cultural settings. The findings suggest that while core mechanisms—such as laryngeal neutrality and subglottic pressure regulation—may retain functional relevance across contexts, their pedagogical transmission benefits from structured, localized curricular sequencing. In this respect, the NYVTM provides a model for culturally responsive operationalization rather than direct methodological transplantation.

Finally, the study contributes to emerging discussions of embodied cognition in vocal performance. Music performance anxiety (MPA) research frequently treats psychological barriers as separable from technical inefficiencies, often recommending cognitive-behavioral interventions alongside, but distinct from, vocal training (Gómez-López & Sánchez-Cabrero, 2023; Jucan et al., 2022). The NYVTM framework advances a complementary perspective: that systematic physiological stabilization may function as a foundational scaffold for psychological confidence. The convergence of quantitative improvements in stage presence with qualitative reports of reduced fear during upper-register singing suggests a functional relationship between biomechanical predictability and expressive security. While causal claims remain beyond the scope of a single-group quasi-experimental design, the findings support the theoretical proposition that technical reliability may reduce cognitive load and facilitate expressive engagement. This perspective contributes to a more integrated understanding of how physiological regulation and psychological assurance interact within CCM performance development.Taken together, these contributions position the NYVTM not merely as a teaching protocol, but as a theoretically informed integrative model that bridges laboratory-derived vocal science, applied studio pedagogy, and performance psychology within a culturally contextualized higher education framework.

5.3 Practical Implications

The implications of this study extend beyond the immediate improvements observed in the experimental cohort, offering applied insights for vocal educators, higher education institutions, and professional practitioners. While the present findings should be interpreted within the constraints of a single-group design, they nonetheless suggest that a structured, science-informed pedagogical sequence can strengthen instructional clarity and support integrated development across technique, health management, and performance embodiment in undergraduate CCM training.

For vocal educators, the NYVTM provides an implementable framework for translating physiological constructs into studio-language and teachable procedures. Popular vocal instruction has often relied on aesthetic modeling and metaphor-based cues, which can be artistically meaningful but may generate inconsistent technical outcomes among novice singers who lack stable proprioceptive reference points. The NYVTM's integration of EVT and SLS offers a pathway to "instructional specificity," encouraging teachers to connect perceptual outcomes (e.g., strain, instability, breathiness, tonal dullness) with identifiable functional targets (e.g., airflow regulation, onset coordination, resonance adjustment, register bridging). In practice, this can support more transparent feedback loops: students can understand not only what to change, but how and why a given adjustment is required. Importantly, this approach does not replace artistic interpretation; rather, it may reduce ambiguity in technical instruction so that expressive goals can be pursued on a more reliable physiological foundation.

At the institutional level, the study underscores the potential value of integrating vocal science more explicitly into curriculum design for popular music programs, particularly within conservatory systems where classical pedagogical traditions remain influential. The NYVTM implementation illustrates that anatomy-informed training and health-oriented protocols can be embedded within performance-centered teaching without displacing repertoire study. A key implication is curricular sequencing: programs may benefit from scaffolding students from baseline physiological coordination (breath–phonation efficiency), through register integration (passaggio stability and resonance balance), and into performance transfer (repertoire application, expressive delivery, and stage embodiment). Such sequencing can support

curriculum coherence, clarify learning outcomes across semesters, and strengthen alignment between studio instruction and assessment practices. In developing pop music departments, a structured syllabus model may also assist with quality assurance, teacher training consistency, and the articulation of competency benchmarks for program evaluation and accreditation.

For professional practitioners and the broader music industry, the implications relate to occupational sustainability and preventative vocal health. Commercial performance environments often involve high vocal load, irregular rehearsal schedules, amplified stage contexts, and stylistic demands that increase fatigue risk. The NYVTM's emphasis on laryngeal neutrality, subglottic pressure regulation, semi-occluded vocal tract exercises, and fatigue monitoring suggests a training orientation that supports prevention rather than remediation. By cultivating self-monitoring strategies and proprioceptive awareness, performers may become more capable of managing vocal load across rehearsal, recording, and touring contexts. Moreover, the study points to an educational shift in agency: singers are positioned not as passive recipients of teacher correction, but as developing self-regulating practitioners who can diagnose early warning signs and apply corrective routines before injury patterns escalate. Although longitudinal evidence is still needed, this orientation is consistent with broader professional priorities of career longevity and vocal resilience.

Finally, the study carries implications for assessment practices in CCM education. The observed improvements across both technical metrics (e.g., range, MPT) and performance-oriented ratings (e.g., expression, stage presence) suggest that evaluation systems may benefit from multi-dimensional measurement frameworks that capture physiological efficiency, acoustic control, and performance embodiment simultaneously. Instructors and programs might therefore adopt assessment rubrics that explicitly integrate technique and artistry, reinforcing the pedagogical premise that technical stabilization and expressive development are interdependent components of CCM competence.Collectively, these implications position the NYVTM not as a prescriptive reform agenda, but as a replicable instructional model illustrating how physiological regulation, vocal health management, and expressive performance can be coherently integrated within undergraduate CCM education. Future applications should consider local institutional conditions, instructor training, and longitudinal follow-up to evaluate durability and transferability across diverse CCM styles and performance demands.

6. CONCLUSION

This study provides empirical evidence supporting the instructional relevance of the Nanying Vocal Training Method (NYVTM) within undergraduate popular music education in a Chinese conservatory context. By integrating the physiological precision of Estill Voice Training (EVT), the functional coordination principles of Speech Level Singing (SLS), and the diagnostic sequencing logic of the Institute for Vocal Advancement (IVA), the NYVTM advances a structured pedagogical framework that aligns anatomical regulation with performance development. The statistically significant improvements observed following the 15-week intervention—most notably the 46.6% expansion in vocal range and the 66.7% increase in breath control—suggest that a physiology-informed, Source–Filter–oriented instructional model can effectively support technical stabilization in novice CCM singers. Rather than treating vocal science and artistic expression as separate domains, the findings indicate that systematic physiological awareness may enhance functional continuity, reduce perceived strain, and facilitate more confident performance embodiment. Although the quasi-experimental design and limited sample size require cautious interpretation, the convergence of quantitative gains and qualitative reports supports the pedagogical coherence of the integrative model. In this respect, the study contributes an evidence-informed and replicable instructional framework demonstrating how vocal science principles can be operationalized within studio teaching to promote both technical development and sustainable performance practice

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