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in AI-integrated education, and comparative studies between formal schooling and tutoring institutions. She employs mixed-method research approaches to explore educational outcomes and contribute to policy and innovation in teaching and learning.

Expertise: Educational Management, Hybrid & Technology-Enhanced Learning, Lifelong Learning, Ethical Leadership in AI Education, Comparative Education, and Mixed-Methods Research.

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preserving and innovating traditional Isan music by blending local styles, such as mōlam and khaen, with Western influences. As an Assistant Dean, he also oversees music infrastructure and supports student development through cultural performances and academic research. His contributions help bridge traditional Thai musical heritage with modern educational practices, enriching both the local community and academic discourse.

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Expertise: Thai dance and drama, folk and religious performance, cultural preservation, contemporary choreography, and community-based arts.

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Her research contributions span both behavioral studies and applied tourism planning. Key projects include analyzing tourist intentions in faith-based tourism in Maha Sarakham Province, and optimizing family travel routes in Buriram using advanced heuristic models. These works combine social science approaches, such as survey analysis, with technical methods like adaptive algorithms, reflecting her interdisciplinary strength. Her studies not only enhance academic understanding but also provide practical insights for local tourism development, helping communities design sustainable tourism experiences.

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Effect of Collaborative Learning Strategies on Musical Literacy of First Year Vocational Students in Guandu Vocational High School

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Abstract

Background and aim: Traditional music instruction in vocational high schools typically follows a teacher-centered, lecture-based teaching pattern, where teachers dominate the knowledge delivery process, and students merely receive information passively. Under this rigid teaching model, vocational students are prone to inattention, emotional boredom, and weak learning initiative, which further leads to unsatisfactory classroom learning outcomes and low efficiency of musical literacy cultivation. Given the shortcomings of conventional music teaching approaches, this study introduced a collaborative learning strategy-oriented teaching model to reform the traditional music education paradigm, with the core goal of enhancing the overall musical literacy of vocational students. The purpose of this study was 1) to compare the musical literacy of vocational students before and after collaborative learning strategies.2) To compare musical literacy with the determined criterion of 70 percent. 3) To compare students' satisfaction after collaborative learning strategies with the determined criterion of 70 percent.

Materials and methods: In this experimental study, 50 first-year students (one class) from Kunming Guandu Vocational High School in the 2025 academic year were recruited as participants. The study adopted a one-group pretest–posttest design. A musical literacy evaluation form was used to assess students' musical literacy before and after the implementation of collaborative learning strategies. Data were collected and analyzed using the arithmetic mean, standard deviation, and paired-samples t-test.

Results: It was found that 1) The average pretest scores of students' musical literacy was 31.66 (SD=4.83), and the average post-test score of students' musical literacy was 50.68 (SD=4.11), the musical literacy after learning through collaborative learning strategies was greater than before learning at the statistical significance level of .01 ($t = 31.19$, $p < .01$). 2) Musical literacy after learning through collaborative learning strategies was greater than the determined criterion of 70% at a .01 statistical significance level. ($M = 50.68$, $SD = 4.11$, $t = 6.51$, $p < .01$). 3) Students' satisfaction after learning through collaborative learning strategies was greater than the determined criterion of 70% at a .01 statistical significance level. ($M = 4.59$, $SD = 0.50$, $t = 14.93$, $p < .01$). This confirms that collaborative learning strategies have a significant positive impact on improving the musical literacy of vocational high school students.

Conclusion: The collaborative learning strategies have a significant effect on improving the musical literacy of vocational high school students.

Keywords: Musical Literacy, Collaborative Learning Strategies, Satisfaction

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Introduction

Music education worldwide is increasingly shifting from teacher-centered instruction to student-centered, interactive pedagogy to cultivate comprehensive musical literacy. However, traditional lecture-based music teaching remains prevalent across many educational contexts, leading to passive student learning, low engagement, and underdeveloped musical competencies that fail to meet 21st-century aesthetic and social learning goals. (Cangro, 2015).

Traditional music lessons rely on one-way lecturing and dull Q&A, leaving students passive and disengaged. Low interaction breeds boredom and "aesthetic fatigue," dragging down both interest and learning efficiency. A more interactive, student-centered model is urgently needed to boost speed, quality, and enthusiasm. (Wu,2019). The content of songs and music in many current textbooks is too backward and cannot keep up with the changes of the times. The era of students' lives is far away from them, so it is difficult for high school students to resonate with them. More students prefer pop music and have less and less interest in high school music classes; therefore, students' learning efficiency is not high. In addition, teachers' lack of innovative teaching models has a great impact on students. (Lian,2025)

In the context of ongoing educational reforms and the increasing emphasis on holistic development, the cultivation of students' artistic literacy has become a key component of vocational high schools' education. Musical literacy, as a crucial aspect of aesthetic education, not only fosters emotional expression and cultural understanding but also contributes to the development of critical thinking, creativity, and social skills. However, in vocational high schools, music education remains marginalized, often treated as a supplementary or non-essential subject. Many vocational schools face challenges such as limited instructional time, insufficient teaching resources, and low student motivation toward music learning. (Chen,2022)

Since it is very important to improve students' musical literacy, students absorb less knowledge with traditional teaching methods. From this point of view, there is a new type of teaching method that could be more appropriate to apply to the students with such characteristics, which is the collaborative learning strategy. In collaborative learning, students with diverse musical skills can complement each other. For example, a student skilled in playing an instrument can help another who excels in composition. This interaction allows students to apply theoretical knowledge to practical tasks more effectively, deepening their understanding of musical concepts. (Li,2012) Collaborative learning provides a platform for emotional communication. Students can share their emotional experiences and deepen their understanding of musical works. This process also helps develop emotional expression and communication skills, which are crucial for musical interpretation. Music often involves group performances, ensembles, and orchestras, where teamwork and coordination are essential. Collaborative learning provides an environment where students can practice these skills in a way that traditional teaching methods cannot. (Gu,2009).

Teachers keep explaining knowledge points, but students can remember very little. So, this study tries other methods to improve students' learning efficiency. Collaborative teaching can improve students' learning efficiency and increase their engagement. This strategy can improve students' interest and make most of their learning more active as well. The comprehensive nature of musical literacy. Musical literacy is not an isolated skill. For vocational high school students, developing musical literacy requires not only mastering the fundamental knowledge and abilities inherent to the discipline itself, but also cultivating essential qualities such as temperament,

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character, ambition, responsibility, adaptability, cultural and scientific knowledge, and physical health. Only through the synergistic interaction of these multifaceted elements can one continuously enhance one's musical literacy.

The collaborative learning strategy is used because Vygotsky's "Zone of Proximal Development" theory points out that vocational high school students can make up for individual cognitive limitations through group collaboration (such as jointly analyzing the harmony of a popular song). Students with a good musical foundation (such as school band members) play the role of "experts" in collaboration and consolidate their own knowledge (by explaining beat calculations to their peers). The communication and division of labor skills cultivated by collaborative learning can be directly transferred to the future work scenarios of vocational high school students (such as kindergarten teachers need to coordinate the cooperation of children when organizing music activities). (Hou & Wang,2025).

Currently, there is very little research in China on the integration of collaborative learning and music courses. Despite established benefits of collaborative learning in music education, most studies focus on primary, secondary, or higher education, with extremely limited quantitative research targets. This study seeks to investigate how collaborative learning strategies can be effectively designed and implemented to enhance the musical literacy of vocational high school students. By examining both theoretical foundations and practical applications, the research aims to contribute to the innovation of teaching models in vocational education, support the development of music curriculum, and ultimately improve students' musical competencies in a meaningful and sustainable way. (Wang, 2025).

Within the Chinese context, Wang (2025) examined collaborative learning in vocational school music teaching, finding that group-based music tasks enhance student interest, cultural awareness, and basic musical skills. Domestic studies also note that traditional teacher-centered music classrooms in vocational high schools lead to passive learning, low participation, and underdeveloped musical literacy, highlighting the need for student-centered reforms. However, nearly all existing vocational music education literature remains descriptive or qualitative, lacking rigorous quantitative intervention designs.

In summary, this study fills contextual and methodological gaps in vocational music education research by providing rigorous quantitative evidence for collaborative learning's efficacy in a vocational high school setting. It validates a feasible student-centered teaching model for understudied vocational students, offering actionable guidance for music educators to reform traditional instruction and improve musical literacy. vocational students, offering actionable guidance for music educators to reform traditional instruction and improve musical literacy. The standardized criterion-based evaluation and consistent paired-samples t-test analysis enhance methodological rigor, establishing a replicable framework for future vocational music education intervention research.

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Research Question

1) How is the musical literacy of vocational students before and after learning through collaborative learning strategies?
2) How is the musical literacy compared with the determined criterion of 70 percent?

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3) What is the students' satisfaction after learning through collaborative learning strategies?

Research Objective

1) To compare the musical literacy of vocational students before and after learning through collaborative learning strategies.

2) To compare musical literacy with the determined criterion of 70 percent.

3) To compare students' satisfaction after learning through the collaborative learning strategies with the determined criterion of 70 percent.

Literature Review

Collaborative Learning Strategies

Collaborative learning can motivate students and allow most of them to participate in class, with everyone having tasks and goals. In this study, collaborative learning strategies were synthesized based on reviewing Gillies (2016), Johnson and Johnson (1990), Jantorn and Rattanarasi (2023), teaching steps of collaborative learning strategies as follows:

Table 1: Steps of teaching collaborative learning strategies

Gillies (2016).	Johnson and Johnson (1990)	Jantan and Rattanarasi (2023)	The results of the synthesis of teaching steps from the author
Step1: Preparing the Learners	Step1: Clear Goals and Interdependence Structures	Step 1: Clarify the Objectives	Step1: Define Goals
Step2: Designing the Task Step3: Group Formation	Step2: Forming Groups	Step 2: Provide Information	Step2: Forming Groups
	Step3: Teach Collaboration Skills	Step 3: Group Activities	Step3: Role Assignment and set clear goals for group members

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Gillies (2016).	Johnson and Johnson (1990)	Jantan and Rattanarasi (2023)	The results of the synthesis of teaching steps from the author
Step4: Facilitating Collaboration	Step4: Monitoring and Intervention	Step 4: Review and Test	Step4: Monitor and Support
Step5: Assessment and: Assessment and Reflection	Step5: Evaluation and Reflection	Step 5: Summarize and Support	Step5: Evaluation and feedback

Therefore, there are mainly five steps in the collaborative learning strategies based on the above information: Step1: Define Goals, Step2: Forming Groups, Step3: Role Assignment, Step4: Monitor and Support, Step5: Evaluation and feedback. The description for each teaching step was presented as follows;

Step1: Define Goals-Set clear goals for what you hope to achieve through collaborative learning. Ensure that the goals are aligned with your curriculum plan and learning outcomes. Clear goal setting helps students understand the purpose of collaboration and provides a clear direction for group activities.

Step2: Forming Groups- Form groups that are balanced in terms of skills and abilities. Mix students with different strengths to promote diverse perspectives and equitable participation. Students are divided into small heterogeneous groups based on their musical abilities and learning characteristics. This grouping strategy encourages peer support, allows students to learn from one another, and reduces learning gaps among students with different skill levels.

Step3: Role Assignment and set clear goals for group members for collaborative learning, and ensure these goals align with the lesson plan and learning outcomes. During the group activities, students discuss, set clear goals, problem-solve, and construct knowledge together. Through discussion and cooperation, students clarify task requirements, exchange ideas, solve musical problems, and collaboratively construct knowledge, which enhances communication skills and a deeper understanding.

Step4: Monitor and Support -Observe group interactions and provide support as needed. Offer guidance to help students stay on track and address any challenges they may encounter. During the collaborative process, the teacher acts as a facilitator by monitoring group progress and classroom dynamics. Timely guidance, feedback, and scaffolding are provided to assist students in overcoming difficulties and to ensure effective collaboration.

Step5: Evaluation and feedback-Have each group present their solutions to the whole class. They should explain their approach and how they arrived at their answers. Each group evaluates the others, and teachers and students work together to summarize the answers. This final step emphasizes reflection and consolidation of learning. Peer evaluation encourages critical thinking and self-reflection, while teacher feedback helps clarify misconceptions. Through joint summarization, key learning points are reinforced, and students gain a clearer understanding of the lesson outcomes.

Musical Literacy

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Musical literacy is an essential component of a student's comprehensive quality. It not only helps cultivate students' aesthetic abilities, creativity, and emotional expression but also promotes brain development and cognitive skills. (Gu,2009). Sun (2025) described musical literacy as the comprehensive abilities and cultivation that an individual possesses in the field of music, including musical knowledge and musical skills. It involves not only the abilities to perceive, understand, perform, and create music but also encompasses cultural literacy related to music. Zhao (2024) described musical literacy as a holistic musical temperament and capability that is formed through long-term accumulation, requiring the internalization and reorganization of musical knowledge through learning and practice, ultimately forming a unique set of concepts, attitudes, and behaviors.

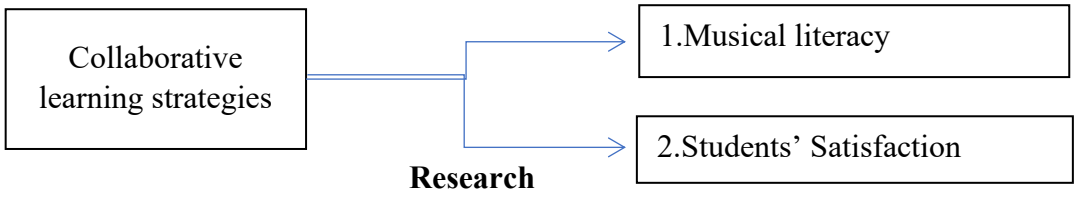
The concept of music literacy encompasses a broad range of competencies beyond mere technical skill. Scholars have defined it as a multifaceted form of cultivation and understanding. Wang (2004) described it as a comprehensive acquisition of musical knowledge, skills, aesthetic experience, and cultural connotation. Similarly, Yang (2024) emphasized the abilities to feel, understand, express, and create music, alongside historical knowledge. This view is expanded by Wang (2024), who frames it as an ability formed through practice, integrating knowledge, aesthetics, expression, and cultural connections. Wang (2019) further characterized it as an inner accomplishment and cultural accumulation, while Rong (2019) provided a cultural perspective, defining it as the cognition, behavior, and value of music within a specific cultural context, promoting multicultural understanding.

Lehman (2008) emphasized a comprehensive view, stating that musical literacy encompasses "the ability to read and write music, to hear and understand what is being performed, to make critical judgments about music, and to have a broad acquaintance with a variety of styles and genres."

Drawing from insights provided by educators and scholars, Musical Literacy can be summarized into three dimensions: Musical knowledge, musical appreciation ability, and musical skill.

Conceptual Framework

Independent variable Dependent variable



Research

Methodology

Population and Sample: The population of this study consists of 300 (6 classrooms) students enrolling in September 2025. The sample of this study includes 50 (1 classroom) first-year students from Kunming Guandu Vocational High School in the 2025 academic year, selected using cluster random sampling. The target population comprised 300 first-year students enrolled at Kunming Guandu Vocational High School in the 2025 academic year. A cluster random sampling method was adopted for this study: all first-grade classes were defined as independent clusters, and one intact class (cluster) was randomly selected as the research sample to ensure representativeness and feasibility of classroom-based intervention implementation. This sampling approach aligns

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with best practices for educational intervention research, as intact classroom clusters reduce disruption to routine teaching and improve data collection validity (Wang, 2025; Cangro, 2015)

The final sample consisted of 50 first-year students (n=50), which is statistically justified for this one-group pretest-posttest design. First, power analysis for paired-samples t-test (the primary statistical method) reveals that a sample size of n=50 achieves a statistical power of 0.80 (α=0.05, two-tailed) to detect a medium-to-large effect size (d=0.60), which meets the minimum power threshold (≥0.80) recommended for social science and educational research (Cohen et al, 1988). Second, prior peer-reviewed music education intervention studies targeting vocational student populations have successfully used similar sample sizes (n=45–55) with cluster random sampling to detect significant intervention effects (Wang, 2025; Cangro, 2015), supporting the appropriateness of this sample scale for the current context. Additionally, the single cluster sample reflects the practical constraints of school-based teaching interventions while maintaining sufficient statistical credibility for this exploratory empirical study.

Experimental Design:

This study used a one-group pretest–posttest design, as shown in the figure below:

Group	pretest	Treatment	Posttest
Experimental	O1	X	O2

O1 was a measurement of musical literacy before the experiment
X was the implementation of using collaborative learning strategies
O2 was a measure of the musical literacy and students' satisfaction after an experiment

Research Instruments: Research instruments were the tools for researching to collect data. The research instruments that were used in this study were:

1. Instruments for Experiment

Lesson plan: There were 8 lesson plans allocated with 18 hours of musical literacy. According to the expert evaluation form, it was found that the mean scores of the appropriateness were at 4.6, and the standard deviation was at 0.27, which means the lesson plans had a quality at a very high level.

2. Instruments for Collecting Data

2.1 The instruments for measuring musical literacy were the musical knowledge test, the musical appreciation ability rubric, and the musical skill rubric. It was found that the Index of Item–Objective Congruence (IOC) of each item ranged from 0.67 to 1.00, which means the test had content validity. For the musical knowledge test, the difficulty of the test items ranged from 0.42 to 0.56, the discrimination index ranged from 0.52 to 0.67, and the KR20 was 0.83. The Cronbach's alpha value of the music appreciation rubric was 0.78, and the Cronbach's alpha value of the music skills rubric was 0.73. Therefore, the musical literacy instrument was proven appropriate for collecting data.

2.2 Questionnaire for students' satisfaction with collaborative learning strategies.

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The instrument used for measuring students' satisfaction with collaborative learning strategies was a student satisfaction questionnaire consisting of 16 items. Three experts in education evaluated the congruence between each questionnaire item and the operational definition. The results showed that the Item-Objective Congruence (IOC) value of all 16 items was 1.00, indicating complete agreement among the experts. This finding demonstrates that all questionnaire items were highly relevant and appropriate for measuring students' satisfaction with collaborative learning strategies. Moreover, the Cronbach's Alpha value of the student satisfaction questionnaire is 0.78; therefore, the questionnaire was proven appropriate for collecting data.

Data Collection: Data collection on musical literacy under the instruction of collaborative learning strategies was as follows:

1) The sample was given the pretest by measuring musical literacy.

2) The sample was taught by using collaborative learning in a music course with 8 lesson plans and 18 total hours.

3) After finishing the instruction, the samples received the posttest by using the same instrument that was used in the pretest.

4) The sample was given the students' satisfaction questionnaire.

Data Analysis: In this study, the quantitative data were analyzed using the statistical program according to the research objectives.

1) Compare the students' musical literacy before and after learning through collaborative learning by using a paired-samples t-test.

2) Compare the students' musical literacy with the determined criteria set at 70 percent by using a paired-samples t-test.

3) Compare the students' satisfaction with collaborative learning by using a paired-samples t-test.

Research Results

According to the research objectives, the results were as follows:

1. The result of comparing the mean score of musical literacy before and after collaborative learning strategies. Descriptive statistics were calculated to summarize students' musical literacy scores before and after the implementation of collaborative learning strategies.

Table 1 presents the means and standard deviations of the pre-test and post-test scores for overall musical literacy and its three components: musical knowledge, music appreciation, and music skills.

Component	Full scores	n	Pretest scores		Post-test scores		*t*	*p*	Effect size
			M	*SD*	*M*	*SD*			
Musical Knowledge	35	50	17.16	4.69	27.90	3.93	17.61**	.001	2.49
Music Appreciation	16	50	6.66	1.61	10.98	1.89	26.55**	.001	3.76
Music Skills	16	50	7.84	1.36	11.80	1.56	19.81**	.001	2.80

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Overall Musical Literacy	67	50	31.66	4.83	50.68	4.11	31.19**	.001	4.41

* * p< 0.01.

As presented in Table 1, the mean scores of the pre-test of musical literacy were 31.66 (SD = 4.83), while the post-test mean score was 50.68 (SD = 4.11). On average, post-test scores were 19.02 points higher than pre-test scores.

Moreover, this study aimed to examine the difference in musical literacy scores before and after the implementation of collaborative learning strategies. The results indicated that students' post-test musical literacy scores were significantly higher than their pre-test scores at the .01 level of statistical significance ($t = 31.19$, $p < .01$). This finding suggests that students' musical literacy improved after collaborative learning strategies. The effect sizes ranged from 2.49 to 4.41; the extremely large effect sizes observed in this study may be partly attributed to the use of identical test instruments in both pre- and post-assessments. Familiarity with test items may have reduced measurement variability and enhanced student performance. Nevertheless, the significant improvements suggest that collaborative learning had a strong positive impact on students' musical literacy. This suggests that the intervention had a substantial and meaningful impact on students' musical knowledge, appreciation, skills, and overall musical literacy.

2. The result of comparing the mean score of musical literacy of students after collaborative learning strategies with the determined criterion set at 70 percent of full scores.

Table 2: The result of the average score of musical literacy after collaborative learning strategies, with the determined criterion set at 70 percent of full scores. (Full score = 67)

Group	n	criterion score	M	SD	t	p
Experimental group	50	46.9	50.68	4.11	6.51**	.001

** p < 0.01

To compare students' musical literacy with the determined criterion of 70 percent, a one-sample t-test was conducted using the post-test total scores. As presented in Table 2, the mean post-test score of musical literacy was 50.68 (SD = 4.11), which was higher than the determined criterion score of 46.90. The results indicated that students' musical literacy scores after learning through collaborative learning strategies were significantly higher than the 70 percent criterion at the .01 level of statistical significance ($t = 6.51$, $p < .01$). This finding suggests that students' musical literacy met and exceeded the expected performance standard.

This statistically significant outcome not only validates the effectiveness of collaborative learning strategies in elevating vocational students' musical literacy but also addresses the core limitation of traditional teacher-centered music instruction in vocational high schools. The large t-value ($t = 6.51$) and stringent significance level ($p < .01$) demonstrate a robust, reliable intervention effect, ruling out random variation as the cause of the score improvement. For first-year vocational students with uneven musical foundations, this result confirms that collaborative peer learning effectively stimulates learning initiative, fills knowledge gaps, and drives tangible progress in core musical competencies, fully aligning with the study's goal of cultivating qualified musical literacy

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in line with the preset benchmark. Moreover, this finding provides empirical support for the practicality of student-centered pedagogical reforms in marginalized aesthetic education courses within vocational education settings.

3. The result of comparing the mean score of satisfaction after collaborative learning strategies with the determined criterion of 70 percent.

Table 3: The means and standard deviations of students' satisfaction after collaborative learning strategies

Dimension of students' satisfaction	**Mean**	**S.D.**	**Levels of Satisfaction**
1) Clarity and Relevance of Music Course Content	4.59	0.49	Very high level
2) Participation and Diversity of Classroom Activities	4.58	0.50	Very high level
3) Effectiveness of Teaching Materials	4.47	0.50	high level
4)Quality of Teachers' Feedback and Evaluation	4.60	0.50	Very high level
5) Satisfaction with Collaborative Learning Methods	4.61	0.50	Very high level
Overall satisfaction of students	**4.59**	**0.50**	**Very high level**

From the results of the arithmetic mean and standard deviation analysis in Table 3, the overall level of students' satisfaction after collaborative learning strategies was M = 4.59, S.D.=0.50. This finding indicates that students demonstrated a high level of satisfaction with the collaborative learning strategies implemented in the music classroom.

Table 4 The comparing the mean score of s students' satisfaction after learning through collaborative learning strategies with the determined criterion set at 70 percent (Full scores = 80)

	Full score	**criterion score**	***M***	***SD***	***t***	***p***
Students' satisfaction	5	3.51	4.59	0.50	14.93**	.001

** $p < 0.01$

To compare students' satisfaction after the implementation of collaborative learning strategies with the determined criterion of 70 percent, a one-sample t-test was conducted using the overall satisfaction scores. The criterion score was set at 3.51, representing 70 percent of the total possible score.

As presented in Table 4, the results showed that the mean satisfaction score of students was4.59 (SD = 0.50), which was significantly higher than the determined criterion at the .01 level of statistical significance ($t = 14.93$, $p < .01$). This finding indicates that students demonstrated a high level of satisfaction toward the collaborative learning strategies implemented in the music classroom.

The exceptionally large t-value ($t = 14.93$) and highly significant p-value ($p < .01$) further reinforce the strong, non-random positive reception of the collaborative learning model among first-year vocational students. Compared with the passive, monotonous atmosphere of traditional music classes, the interactive peer collaboration model effectively alleviates student boredom and inattention, catering to the active learning preferences of vocational students and fostering a

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positive classroom atmosphere. The mean satisfaction score far exceeding the 70% benchmark reveals that this teaching approach not only improves academic performance but also enhances student engagement and sense of participation, proving its high acceptability and adaptability in the vocational high school music teaching context. This result also complements the musical literacy outcome, confirming that collaborative learning strategies achieve a dual improvement in both learning effectiveness and student experience, which is critical for sustaining long-term participation in aesthetic education for vocational students.

Conclusion

This study evaluated the effectiveness of collaborative learning strategies on the musical literacy of first-year vocational high school students at Guandu Vocational High School (2025 academic year) via quantitative analysis, including arithmetic mean, standard deviation, and paired-samples t-test. As presented in Tables 1 and 2, students' musical literacy scores demonstrated a statistically significant improvement post-intervention, and their overall satisfaction with the collaborative learning approach reached an exceptionally high level. These findings validate the feasibility and practical value of implementing collaborative learning strategies in vocational high school musical literacy courses, confirming that this pedagogical approach effectively fosters musical literacy development for the target student cohort. Beyond skill enhancement, the intervention also optimized the classroom learning experience and boosted student engagement, providing a reliable empirical foundation for music teaching reform in vocational education.

Discussion

Discussion of research objectives 1 and 2: the students' musical literacy was able to cultivate through the collaborative learning strategies. This result may be due to the effect that the five steps of collaborative learning strategies have on the students' learning process:

The musical literacy after learning through collaborative learning strategies was higher than before at a statistically significant level of .01($t = 31.19$, $p < .01$).The average pretest score of students' musical literacy was 31.66 (SD=4.83), and the average post-test score of students' musical literacy was 50.68(SD=4.11).In addition, the musical literacy after collaborative learning strategies was higher than the determined criterion of 70% at a .01 statistical significance level. ($M=50.68$, $SD=4.11$, $t=6.51$, $p < .01$).

Based on the verification of the overall effectiveness of collaborative learning, this study further demonstrates that the significant improvement in students' musical literacy is not a coincidence but rather stems from the scientific design and implementation of a systematic teaching approach. Specifically, the five collaborative learning steps—"goal setting—group construction—role assignment—process monitoring and support—evaluation and feedback"—work together in music teaching, progressing step by step, and playing a crucial role in the development of students' musical literacy. These two results show that the students 'musical literacy was able to be cultivated through the collaborative learning strategies. These results may be due to the effect that the five steps of collaborative learning strategies have on the students' learning process:

First, clearly defined learning objectives provided clear direction for collaborative learning, ensuring that learning activities were closely aligned with the curriculum goals and effectively

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improved learning efficiency (Slavin, 2014). Clearly defined learning objectives lay a solid foundation for collaborative music learning. By closely aligning collaborative learning tasks with curriculum goals and learning outcomes, students can clearly understand the musical literacy elements they need to develop, such as rhythm, musical expression, or theoretical comprehension. Clear goal setting prevents collaborative learning from becoming merely a formality, ensuring that students' collaborative activities always revolve around the core content of music learning, thereby effectively promoting the development of musical cognition and skills.

Second, heterogeneous grouping provided students with peer scaffolding support, promoting musical understanding and skill development through demonstration, explanation, and mutual assistance (Vygotsky, 1978; Johnson & Johnson, 2009). The scientifically constructed heterogeneous learning groups create excellent peer learning conditions for improving musical literacy. By reasonably combining students with different musical backgrounds, ability levels, and learning styles, collaborative learning promotes demonstration, explanation, and mutual assistance among students. Students with stronger musical abilities deepen their understanding during the explanation process, while students with weaker foundations gradually construct musical knowledge with the support of their peers, achieving common progress.

Third, clearly defined roles enhanced students' sense of responsibility and participation, reduced passive learning, and helped improve self-efficacy (Burnard, P., & Dragovic, T., 2015). Clearly defined roles within groups significantly enhance the structure of collaborative learning and foster a sense of individual responsibility. By assigning specific roles such as rhythm coordinator, recorder, performance coordinator, or discussion facilitator, each student can find their place in the collaboration, avoiding the "free-rider" phenomenon. This role-based approach not only increases student participation but also enhances their self-efficacy and engagement in learning, contributing to the holistic development of their musical literacy.

Fourth, teachers' process monitoring and support ensure the quality of collaborative learning, helping students correct misunderstandings and optimize the collaborative process (Gillies, 2016). Teachers' ongoing monitoring and support ensured the quality of collaborative learning. By observing group interactions and providing timely musical guidance and learning strategy suggestions, teachers helped students correct misunderstandings and resolve problems encountered during collaboration. This dynamic support mechanism ensured that collaborative learning-maintained student autonomy while effectively achieving music learning objectives.

Fifth, a multi-faceted evaluation and feedback mechanism promotes reflective learning and deep understanding among students through presentations, peer assessments, and teacher-student summaries (Hattie & Timperley, 2007). The evaluation and feedback process played a crucial role in promoting reflective learning among students. Through group presentations, peer review, and joint teacher-student summaries, students not only presented their learning outcomes but also explained their musical thought processes and learning strategies. This diverse feedback helped students compare different musical solutions, deepen their understanding of musical concepts, and internalize external evaluations into their own learning experiences.

The five-step collaborative learning framework (goal setting—group construction—role assignment—process monitoring and support—evaluation and feedback) does not merely function as a procedural teaching design, but integrates social constructivism, cognitive engagement theory, and motivation theory to reshape students' music learning patterns, which is the core reason for the significant intervention effect.

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Social Constructivism (Vygotsky, 1978; Johnson & Johnson, 2009): This theory posits that knowledge construction is a social interactive process, and cognitive development relies on peer scaffolding within the "zone of proximal development". The heterogeneous grouping design in this study created a diversified peer interaction environment: students with advanced musical abilities provided cognitive scaffolding for peers with weaker foundations through demonstration and explanation, while consolidating their own knowledge output. This social interactive model broke the limitations of traditional teacher-centered instruction, turning individual music learning into a collective knowledge construction process, which directly promoted the internalization of musical theoretical knowledge and practical skills.

Cognitive Engagement Theory: Cognitive engagement refers to students' psychological investment in learning, including deep processing of knowledge and active thinking. Clear learning goals anchored collaborative activities to core musical literacy elements (rhythm, musical expression, theoretical comprehension), avoiding superficial interaction; clear role assignment eliminated free-riding and forced every student to participate in cognitive processing rather than passive listening; multi-dimensional evaluation and feedback pushed students to reflect on their learning strategies, realizing deep cognitive engagement instead of superficial memorization. This sustained cognitive engagement is the key to transforming temporary knowledge into stable musical literacy.

Motivation Theory (Slavin, 2014; Bandura, 1997): The collaborative learning model stimulated both intrinsic and extrinsic motivation. Shared group responsibility linked individual efforts to collective success, enhancing students' sense of mission; continuous peer and teacher feedback strengthened their perceived competence; successive task completion through cooperation boosted self-efficacy. Driven by multiple motivational factors, students transformed from passive recipients to active learners, maintaining sustained learning enthusiasm and laying a psychological foundation for musical literacy improvement.

In essence, the five-step collaborative learning strategy forms a closed loop of "goal guidance—social interaction—cognitive input—feedback optimization", which systematically promotes students' musical literacy development at cognitive, skill, and emotional levels. This significant improvement is not a coincidental result, but an inevitable outcome of aligning teaching design with advanced educational theories.

Discussion of research objective 3: The students' satisfaction was able to improve through the collaborative learning strategies.

Descriptive statistics (Table 4) showed that overall student satisfaction with collaborative learning reached a high level (M=4.59, SD=0.50), with subscale scores (course content, classroom activities, learning atmosphere, etc.) all exceeding 4.45. This high satisfaction is not an isolated emotional response, but a concentrated reflection of the optimization of the music learning experience, which can be summarized into three core insights:

Enhanced Learning Engagement: Diversified interactive activities (group discussion, ensemble performance, peer problem-solving) replaced passive indoctrination, stimulating students' interest in music learning and boosting their behavioral and emotional engagement, which is the primary driver of high satisfaction.

Timely Multi-Source Feedback: Teacher evaluation combined with peer assessment and group reflection formed a three-dimensional feedback mechanism, helping students perceive

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learning progress in real time, enhancing their sense of achievement and competence, and further consolidating learning satisfaction.

Positive Social Interaction: Collaborative interaction reduced learning anxiety and isolation, building a supportive classroom atmosphere. The sense of belonging and relatedness generated from peer cooperation met students' social needs, forming a positive emotional connection with music learning.

These three dimensions interact with each other, proving that collaborative learning not only improves academic outcomes but also optimizes the affective learning experience, achieving a win-win between skill improvement and emotional satisfaction. In summary, the high level of student satisfaction observed in this study can be understood as the combined result of diversified learning activities, timely feedback, positive social interaction, shared responsibility, and enhanced self-efficacy. These factors collectively demonstrate that collaborative learning not only improves musical literacy but also creates a supportive and emotionally engaging learning environment that enhances students' overall learning experience.

Existing collaborative learning research mostly focuses on general education or basic academic subjects, with insufficient attention to vocational music education. This study systematically integrates collaborative learning theory with vocational music teaching, verifying its applicability to vocational student cohorts. By linking intervention effects to social constructivism, cognitive engagement, and motivation theory, it enriches the theoretical framework of music pedagogy in vocational education, expands the application boundaries of collaborative learning theory, and provides a theoretical reference for targeted teaching research in vocational art education.

This study possesses significant theoretical and practical innovative value in the fields of music education and vocational education. It systematically introduces collaborative learning theory into the music teaching context of secondary vocational schools, addressing the insufficient focus on vocational music classrooms in existing research. Compared to existing studies targeting general subjects or basic education, this study, through empirical analysis, demonstrates that collaborative learning can also effectively promote the development of musical literacy among secondary vocational school students, thereby expanding the application scope of collaborative learning theory.

This study confirms that collaborative learning strategies have a significant positive impact on improving the musical literacy of vocational high school students. Collaborative learning not only improves students' music academic performance but also enhances their learning motivation, self-efficacy, social skills, and learning satisfaction. These findings indicate that collaborative learning is an effective teaching method in vocational high school music education.

By transforming students from passive recipients of knowledge into active participants in the learning process, collaborative learning empowers students with the ability to learn music autonomously and cultivates their comprehensive musical literacy. Therefore, implementing collaborative learning strategies in vocational music education holds great promise for improving educational quality and promoting students' all-around development.

Recommendation

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Recommendation for Implication: Based on the findings of this study, several pedagogical recommendations are proposed to enhance the effectiveness of collaborative learning in vocational high school music education.

1. Systematically integrate collaborative learning into music curricula

The findings of this study demonstrate that collaborative learning strategies can improve students' musical literacy and learning satisfaction. Therefore, music educators in vocational high schools are encouraged to systematically integrate collaborative learning into curriculum design rather than treating it as an occasional instructional method. Previous research has indicated that sustained implementation of cooperative learning yields more stable and long-term learning benefits than sporadic application.

2. Clearly define learning objectives and collaborative tasks

Before implementing collaborative learning, teachers should clearly define instructional goals and ensure that collaborative tasks are aligned with curriculum standards and learning outcomes. Clear goal orientation helps students understand the purpose of collaboration and enhances learning focus and effectiveness (Slavin, 2014). In music education, explicit goals related to musical literacy—such as rhythm accuracy, expressive performance, and musical interpretation—can guide students' collaborative efforts more effectively.

3. Form heterogeneous groups to promote peer learning and interaction

Reasonable group formation is a key factor influencing the success of collaborative learning. Teachers are advised to form heterogeneous groups by considering students' musical abilities, learning styles, and personality traits. Such grouping promotes peer scaffolding, mutual support, and diverse perspectives, which are essential for musical understanding and skill development.

4. Provide continuous monitoring and instructional support

Although collaborative learning emphasizes student-centered learning, the teacher's role remains crucial. Teachers should actively monitor group interactions, provide timely guidance, and intervene when necessary to address misunderstandings or group conflicts. Instructional scaffolding ensures that collaborative learning remains focused on musical objectives and maintains a high level of instructional quality (Gillies, 2016).

5. Address individual differences and promote inclusive participation

Vocational high school students demonstrate diverse musical backgrounds and learning needs. Teachers should design differentiated tasks and provide flexible support to ensure that all students can participate meaningfully in collaborative activities. Attending to individual differences helps enhance learning motivation, self-efficacy, and satisfaction (Deci & Ryan, 2000).

6. Emphasize formative evaluation and multi-source feedback

Evaluation and feedback are essential components of effective collaborative learning. Teachers should establish a comprehensive evaluation system that incorporates self-assessment, peer assessment, and teacher feedback. Timely and constructive feedback helps students recognize learning progress, refine musical skills, and sustain learning motivation (Hattie & Timperley, 2007).

7. Encourage independent learning within collaborative contexts

Collaborative learning should not replace independent learning but rather complement it. Teachers are encouraged to guide students in developing independent practice and inquiry skills

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while participating in group activities. This balance helps students build autonomous learning competence alongside cooperative skills (Slavin, 2014).

8. Continuously update teachers' pedagogical knowledge and skills

To effectively implement collaborative learning, music educators should continuously update their teaching concepts and instructional skills. Professional development activities such as training workshops, academic reading, and peer collaboration can enhance teachers' capacity to design and facilitate high-quality collaborative music learning experiences (Gillies, 2016).

In summary, these recommendations emphasize that the effectiveness of collaborative learning in music education depends on intentional design, structured implementation, and continuous pedagogical reflection.

Recommendation for Further Research: Despite the meaningful findings of this study, several directions for future research are suggested.

To address the limitations of this single-cohort, single-school study and deepen the empirical and theoretical basis of collaborative learning in vocational music education, future research is recommended to focus on specific, targeted directions rather than broad exploration:

1. Large-scale empirical validation across vocational education contexts: Conduct multi-school, multi-grade research in secondary vocational education to verify the generalizability of this study's findings, and quantify collaborative learning's long-term effects on musical literacy retention (6–12 months post-intervention).

2. Targeted research on individual differences and equity: Explore how collaborative learning impacts vocational students with zero musical foundation or special learning needs, and optimize differentiated collaborative tasks to promote inclusive music education.

3. Hybrid teaching model innovation: Integrate collaborative learning with digital music tools (e.g., online rhythm platforms, ensemble software) to explore technology-enhanced collaborative models suitable for vocational music classrooms.

4. Deepened theoretical mechanism research: Combine quantitative and qualitative methods to explore the mediating effect of cognitive engagement and social interaction between collaborative learning and musical literacy development, refining the theoretical framework.

Future research should prioritize methodological rigor and practical relevance to vocational music education, providing actionable evidence for sustained teaching reform.

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Acceptance Letter for Publication

To **Chen Weihong, Nitikorn Onyon, and Thapana Choicharoen**

Following the submission of your manuscript entitled **"Effect of Collaborative Learning Strategies on Musical Literacy of First Year Vocational Students in Guandu Vocational High School"** to the *Interdisciplinary Academic and Research Journal (Online)*, Old ISSN: 2774-0374 (Online) and New ISSN: 2985-2749 (Online), we are pleased to inform you of the outcome of the editorial and peer-review process.

The *Interdisciplinary Academic and Research Journal (IARJ)* is indexed by the **Thailand Citation Index (TCI Tier 2)** and is a member of **Crossref (DOI)**. In addition, articles published in the journal are retrievable through recognized international academic databases and library systems, including **Google Scholar, Semantic Scholar, Scilit, Harvard Library, and OUCI (Open Ukrainian Citation Index)**.

Your manuscript has undergone a rigorous peer-review process and was evaluated by three expert reviewers in the relevant field from various external institutions, all of whom are independent and have no affiliation with the author's organization. Based on the reviewers' evaluations and recommendations, the Editorial Board is pleased to confirm that your article has been **accepted for publication** in the *Interdisciplinary Academic and Research Journal*.

The article is scheduled for publication in **Volume 6, Issue 6 (November-December 2026)**. The publication status and progress of the article can be followed online at: https://so03.tci-thaijo.org/index.php/IARJ/about

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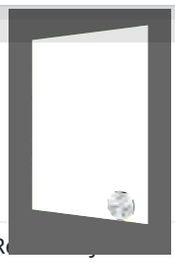
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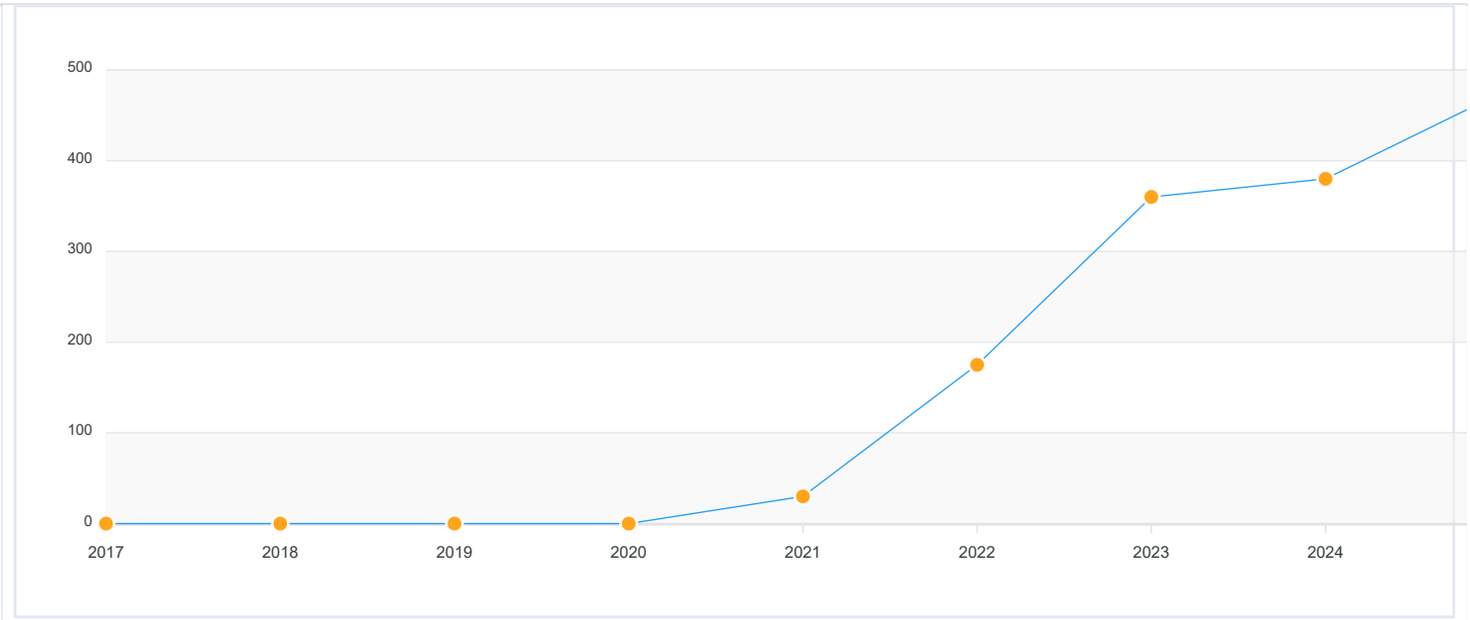
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