European Journal of Education Studies
ISSN: 2501 - 1111
ISSN-L: 2501 - 1111
Available online at: www.oapub.org/edu

DOI: 10.46827/ejes.v13i5.6626 Volume 13 | Issue 5 | 2026

THE EFFECT OF COOPERATIVE LEARNING ON STUDENTS' MOTIVATION AMONG BACHELORS' DEGREE PIANO BEGINNERS IN GUANGDONG PROVINCE, CHINA

Xin Zhao[1],
Huey Yi @ Colleen Wong[2i]
[1]Faculty of Music and Performing Arts,
Sultan Idris Education University,
Malaysia
[2]Dr.
Faculty of Music and Performing Arts,
Sultan Idris Education University,
Malaysia

Abstract:
This study investigated the impact of cooperative learning strategies on students' motivation among beginner piano students enrolled in bachelor's degree programs in Guangdong Province, China. Using a cluster-randomized quasi-experimental design, the research compared four groups: two control groups receiving traditional instruction, an experimental group using Reciprocal Peer Tutoring (RPT) with Jigsaw II, and another using RPT with Teams-Games-Tournament (TGT). A total of 64 students participated and were assessed the effect of cooperative learning strategies on students' motivation (attitude, autonomy, and social relatedness). Multivariate Analysis of Variance (MANOVA) revealed a statistically significant main effect of instructional group on learning motivation (Wilks' $\Lambda = 0.726$, $F(12, 309.80) = 3.32$, $p < .001$, partial $\eta^2 = .101$). Follow-up univariate ANOVAs showed significant group differences in overall motivation ($F(3, 120) = 8.04$, $p < .001$, $\eta^2 = .167$). In particular, the RPT-Jigsaw II group consistently achieved the highest scores across all dependent variables. These findings suggest that cooperative learning strategies enhance the motivational outcomes in early music education. The results support the implementation of structured, peer-based instructional models to increase engagement and foster a more supportive learning environment among novice piano learners. The main contribution of this study lies in demonstrating that structured cooperative learning methods significantly enhance the motivational engagement of beginner piano students, offering a viable pedagogical alternative to traditional instruction in higher music education.

[i] Correspondence: email colleen@fmsp.upsi.edu.my

Keywords: cooperative learning; student motivation; piano education; music pedagogy; undergraduate students; China

1. Introduction

In recent decades, higher education has increasingly emphasized student-centered instructional approaches that promote interaction, collaboration, and active participation in learning. Among these approaches, cooperative learning has gained considerable attention as an effective strategy for enhancing students' academic achievement and learning attitudes. Cooperative learning refers to a structured pedagogical approach in which students work together in small groups to achieve shared learning goals while supporting each other's understanding and performance (Johnson, Johnson, & Smith, 2014). Unlike traditional teacher-centered instruction, this approach encourages learners to construct knowledge through discussion, peer feedback, and collaborative problem-solving. Numerous studies have shown that cooperative learning positively influences students' academic performance, engagement, and social development across educational contexts (Hattie, 2009; Kyndt *et al.*, 2013).

Motivation is widely recognized as a key factor influencing students' learning behavior and academic success. According to Self-Determination Theory, students' motivation is shaped by the extent to which their learning environment supports three basic psychological needs: autonomy, competence, and relatedness (Ryan & Deci, 2000; Ryan & Deci, 2020). Learning environments that encourage interaction and collaboration can help satisfy these needs by promoting students' sense of belonging, competence, and active participation in learning activities (Niemiec & Ryan, 2009). Consequently, cooperative learning strategies have increasingly been adopted in higher education to enhance students' motivation and engagement.

In music education, motivation plays a crucial role in shaping students' persistence, practice habits, and musical development. Research indicates that collaborative learning environments in music classrooms can strengthen students' engagement and interest by enabling peer interaction, shared musical experiences, and constructive feedback (Creech, Hallam, Varvarigou, & McQueen, 2022; Sun, Rauduvaitė, Sun, & Yao, 2024). These collaborative experiences support both musical skill development and social learning, which are essential for effective music education.

One context where cooperative learning may be particularly valuable is group piano instruction. Traditionally, piano teaching has relied on one-to-one lessons focused on individualized training. However, many universities have increasingly adopted group piano classes as a practical approach for teaching keyboard skills to larger numbers of students. In this format, multiple students learn piano simultaneously within a classroom environment under the supervision of a teacher (Pike, 2017). Group piano instruction provides opportunities for peer observation, collaborative practice, and shared learning experiences that can support deeper musical understanding.

Despite the growing interest in collaborative learning in music education, many piano classes—especially in higher education—still follow teacher-centered instructional models in which students practice individually while the teacher provides demonstrations and corrections. Although this approach may effectively develop technical skills, it may not fully utilize the benefits of peer interaction and collaborative learning. Research suggests that incorporating cooperative learning strategies in music education can enhance students' motivation, participation, and collaborative skills (Biasutti & Concina, 2023; Zhao & Wong, 2024). Therefore, investigating the role of cooperative learning in piano education is increasingly important. Accordingly, this study examines the effect of cooperative learning on students' motivation—specifically attitudes, autonomy, and social relatedness—among bachelor's degree piano beginners in Guangdong Province, China.

2. Literature Review

Cooperative learning has become one of the most influential student-centered instructional approaches in contemporary education. It refers to a structured pedagogical strategy in which students work together in small groups to achieve shared learning goals while supporting each other's learning processes (Johnson, Johnson, & Smith, 2014). Unlike traditional teacher-centered teaching, cooperative learning emphasizes interaction, shared responsibility, and collective problem-solving among learners. Through discussion, peer feedback, and collaborative task completion, students actively construct knowledge rather than passively receiving information from the instructor.

Extensive empirical research has demonstrated the effectiveness of cooperative learning in improving students' academic performance and engagement. Hattie (2009), in his synthesis of over 800 meta-analyses on educational achievement, reported that collaborative learning strategies significantly enhance students' learning outcomes. Similarly, Kyndt *et al.* (2013) found that students participating in cooperative learning environments show higher academic achievement and more positive attitudes toward learning compared with those in traditional instructional settings. These findings suggest that cooperative learning provides both cognitive and motivational benefits, making it particularly relevant in educational contexts that require active participation and interaction among learners.

In addition to academic benefits, cooperative learning has been shown to enhance students' social skills and motivation. By working together toward common goals, students develop communication skills, mutual respect, and a sense of responsibility for group success. These social processes contribute to a more supportive learning environment, which can increase students' engagement and persistence in learning tasks.

2.1 Cooperative Learning in Music Education

Within music education, cooperative learning has received increasing attention as a pedagogical approach that supports both musical development and student engagement.

Music learning often involves complex cognitive, technical, and expressive processes that benefit from interaction among learners. Collaborative learning environments allow students to share ideas, observe peers' performances, and provide constructive feedback, thereby promoting deeper musical understanding. Research suggests that collaborative music learning environments can significantly enhance students' participation and creativity. Burnard and Murphy (2022) emphasize that collaborative creativity in music education encourages students to explore musical ideas collectively and engage more actively in the learning process. Similarly, Creech *et al.* (2022) found that active music-making and collaborative learning activities improve student engagement and promote meaningful musical experiences in higher education contexts.

Recent studies have also highlighted the role of collaborative learning in supporting students' self-regulated learning and motivation in instrumental music education. Biasutti and Concina (2023) reported that collaborative learning strategies enhance students' engagement and self-regulated learning behaviors in instrumental music training. Likewise, Cavitt (2022) found that collaborative music-making activities in ensemble settings increase students' motivation and participation in music learning environments. These findings suggest that cooperative learning strategies may provide important pedagogical benefits in instrumental music education, including piano instruction.

2.2 Cooperative Learning in Group Piano Instruction

Piano pedagogy has traditionally relied on individualized instruction through one-to-one lessons between teacher and student. However, the rapid expansion of higher education music programs has led to the increasing adoption of group piano classes, where several students learn piano simultaneously under the supervision of a teacher. Group piano instruction provides opportunities for peer observation, collaborative practice, and interactive learning that are not typically available in individual lessons (Pike, 2017). In group piano settings, cooperative learning strategies can facilitate peer interaction and collaborative problem-solving during musical practice. Students can observe each other's performances, exchange feedback, and jointly explore solutions to technical and musical challenges. Such interactions may contribute to improved musical understanding and performance confidence.

Recent research also highlights the importance of interactive learning environments in music education. Fredriksson and Ferm Thorgersen (2024) emphasize that supportive and collaborative teaching practices play a crucial role in facilitating students' musical learning. Similarly, Sun *et al.* (2024) argue that cooperative learning strategies in music education enhance communication, engagement, and collaborative problem-solving abilities among students. Despite these potential advantages, many group piano classes still rely heavily on teacher-centered instruction in which students practice individually while the teacher provides demonstrations and corrections. Such approaches may limit opportunities for peer interaction and collaborative learning, thereby reducing the potential motivational benefits of group instruction.

2.3 Motivation in Music Learning

Motivation is widely recognized as a key factor influencing students' engagement, persistence, and success in music education. Learning to play a musical instrument requires sustained practice, concentration, and emotional commitment, all of which are strongly influenced by learners' motivational states. Self-Determination Theory provides an important framework for understanding motivation in educational contexts. According to Ryan and Deci (2000, 2020), motivation is influenced by the satisfaction of three basic psychological needs: autonomy, competence, and relatedness. When these needs are fulfilled, students are more likely to develop intrinsic motivation and actively engage in learning activities.

Cooperative learning environments can support these motivational needs in several ways. First, collaborative learning activities provide opportunities for students to exercise autonomy by participating actively in group tasks and decision-making processes. Second, peer interaction and collaborative problem-solving can enhance students' sense of competence by allowing them to receive feedback and support from peers. Third, working together toward shared goals fosters social relatedness, creating a sense of belonging within the learning environment (Niemiec & Ryan, 2009). These motivational benefits are particularly important in music education, where students' persistence and engagement play a crucial role in skill development.

2.4 Research Gap

Despite the extensive research on cooperative learning in general education, its application in piano pedagogy remains relatively underexplored. Most studies on cooperative learning have focused on academic subjects such as mathematics, science, and language learning, where collaborative strategies have been shown to enhance academic achievement, engagement, and social interaction among students (Hattie, 2009; Kyndt *et al.*, 2013). In contrast, piano instruction has traditionally relied on one-to-one teaching formats, and even in university group piano classes, instruction often remains teacher-centered, with students practicing individually while the instructor provides demonstrations and corrections (Pike, 2017).

Although recent research suggests that collaborative learning approaches can improve interaction, engagement, and learning interest in music education contexts (Sun *et al.*, 2024), empirical studies examining the impact of cooperative learning on motivational outcomes in piano education remain scarce. In particular, limited attention has been given to how cooperative learning may influence key motivational dimensions such as learning attitudes, autonomy, and social relatedness among beginner piano students. Therefore, further research is needed to investigate the role of cooperative learning in enhancing students' motivation in group piano instruction, particularly in higher education contexts. Accordingly, this study examines the effect of cooperative learning on learning motivation—specifically attitudes, autonomy, and social relatedness—among beginner piano students compared with traditional teaching methods.

3. Material and Methods

This study employed a cluster-randomized quasi-experimental design to examine the effect of cooperative learning on beginner piano students' learning motivation in Chinese university classrooms. Four intact first-year undergraduate piano classes were included in the study and randomly assigned to experimental and control conditions. All participants were beginner-level students with no prior formal music training, which helped reduce pre-existing differences and allowed the study to focus on the motivational effects of the instructional interventions during the early stage of piano learning. Two classes served as experimental groups and two as traditional control groups. In the experimental condition, cooperative learning was implemented in two consecutive four-week phases. Group G3 received Reciprocal Peer Tutoring (RPT) in Phase 1, followed by Jigsaw II in Phase 2, whereas Group G4 received RPT in Phase 1, followed by Teams-Games-Tournament (TGT) in Phase 2. Groups G1 and G2 were taught using matched traditional teacher-centered methods without cooperative learning components. Students' motivation was measured before and after the eight-week intervention using the same questionnaire.

To strengthen internal validity, several implementation controls were applied. Standardized lesson plans were centrally prepared and aligned with clearly defined instructional objectives. All instructors participated in pre-intervention briefing and training sessions to standardize delivery, clarify treatment procedures, and reduce contamination across groups. In addition, treatment fidelity was monitored throughout the intervention through classroom observations and instructor self-reports to ensure that each class adhered to its assigned instructional approach. Although the use of intact classes and a real university setting enhanced ecological validity, the findings are most directly generalizable to similar higher education contexts involving beginner Chinese undergraduate piano learners.

3.1 Instrument

Learning motivation was measured using an adapted Piano Learning Motivation Questionnaire grounded in Self-Determination Theory (SDT) (Deci & Ryan, 1985; Ryan & Deci, 2017). The instrument was adapted from two established scales: the Basic Psychological Needs of Second Language Scale (BPN-L2) and the Cooperative Learning Attitude Scale (CLAS). Items were reworded to fit the context of piano learning while preserving the original theoretical meaning of the constructs. The final questionnaire comprised 20 items across three dimensions: Competence (5 items), Autonomy (4 items), and Relatedness (11 items). Each item was rated on a 5-point Likert scale ranging from strongly disagree to strongly agree.

The adaptation process followed several stages to ensure contextual relevance and validity. First, items were reviewed and modified for the piano learning context. Next, the questionnaire was translated from English into Mandarin Chinese using a forward–backward translation procedure to maintain semantic and conceptual equivalence.

Content validity was then evaluated by three PhD-level experts in music education, educational psychology, and cooperative learning. All items achieved perfect agreement at the item and scale levels (I-CVI = 1.0; S-CVI/Ave = 1.0), indicating excellent content validity. Minor wording revisions were made based on expert feedback.

3.2 Pilot Study and Psychometric Testing

Before the main experiment, a pilot study was conducted to test the feasibility of the cooperative learning procedures and the motivational instrument. A small preliminary pilot involving 16 participants was used to refine the duration of sessions, timing of cooperative activities, and lesson flow. Subsequently, the adapted motivation questionnaire was pilot-tested with 220 non-piano music majors from universities in Guangdong Province to evaluate clarity, language appropriateness, and construct validity.

Exploratory factor analysis supported a clear three-factor structure aligned with SDT. The dataset was highly suitable for factor analysis (KMO = 0.915; Bartlett's Test, $p < .001$), and the three extracted factors explained 63.20% of the total variance. All retained items loaded strongly on their intended factors, with no problematic cross-loadings. Confirmatory factor analysis further supported the measurement model, with acceptable fit indices ($\chi^2/df = 2.026$, GFI = 0.865, AGFI = 0.830, CFI = 0.926, TLI = 0.916, RMSEA = 0.071). Composite reliability values ranged from 0.828 to 0.932, while average variance extracted values ranged from 0.546 to 0.571, indicating satisfactory convergent validity. Discriminant validity was also supported, as inter-construct correlations remained below the accepted threshold and the square roots of AVE exceeded the corresponding correlations.

The questionnaire also demonstrated strong reliability. Based on pilot data from 206 first-year undergraduate students, Cronbach's alpha coefficients were 0.882 for Competence, 0.847 for Autonomy, and 0.910 for Relatedness, with an overall reliability coefficient of 0.943. These results indicate excellent internal consistency and support the use of the questionnaire for measuring students' motivation in the present study.

3.3 Data Analysis

Data were analyzed using descriptive statistics, t-tests, and multivariate analysis of variance (MANOVA) to examine differences in motivation between the cooperative learning and traditional teaching groups. The analyses focused on overall learning motivation and its three dimensions: competence, autonomy, and relatedness. Pre-test and post-test comparisons were used to determine whether the cooperative learning interventions produced greater motivational gains than the traditional instructional approach.

4. Results and Discussion

This section addresses the research question: What is the effect of cooperative learning on learning motivation (attitude, autonomy, and social relatedness) among beginner piano students compared to the traditional teaching method? The focus is on examining how distinct instructional strategies—particularly cooperative learning methods such as Reciprocal Peer Tutoring (RPT), Jigsaw II, and Team-Games-Tournament (TGT)—influence students' motivational constructs in the context of early piano education. Using Multivariate Analysis of Variance (MANOVA), this section evaluates whether these dimensions significantly differ between students exposed to cooperative learning environments and those taught using traditional teacher-centered approaches.

4.1 Descriptive Statistics

Prior to conducting inferential analyses, descriptive statistics (Table 1) were computed to summarize the distribution of motivation scores across the experimental and control groups at each assessment point. These included means and standard deviations for the overall motivation score as well as its subcomponents—attitude, autonomy, and social relatedness.

Table 1: Descriptive Statistics for Motivation Scores by Group and Test

		Pre-test		Post-test	
Dependent Variable	**Group**	**M**	**SD**	**M**	**SD**
Learning Attitude (LA)	Control 1	3.28	0.46	2.13	0.32
	Control 2	3.08	0.69	2.64	0.81
	Exp 1	2.68	0.61	3.78	0.44
	Exp 2	2.83	0.57	3.00	0.72
Autonomy (AU)	Control 1	3.00	0.00	3.30	0.62
	Control 2	3.00	0.00	3.03	0.49
	Exp 1	3.00	0.00	3.89	0.60
	Exp 2	3.00	0.00	3.64	0.52
Social Relatedness (SR)	Control 1	3.41	0.20	3.51	0.49
	Control 2	3.52	0.32	3.69	0.87
	Exp 1	3.47	0.18	4.18	0.19
	Exp 2	3.69	0.31	3.91	0.36
Overall Motivation	Control 1	3.29	0.11	3.12	0.40
	Control 2	3.31	0.26	3.30	0.64
	Exp 1	3.18	0.21	3.96	0.18
	Exp 2	3.33	0.20	3.61	0.28

At pre-test, students across all groups reported comparable levels of motivation, suggesting a reasonably balanced starting point. Autonomy scores were identical across all groups at pre-test (M = 3.00, SD = 0.00), indicating no variability in students' perceived self-direction before the intervention. Post-test results revealed meaningful increases in motivation, particularly within the experimental groups. In the Learning Attitude domain, Exp 1 improved from M = 2.68 to M = 3.78, while Control 1 decreased from M =

3.28 to M = 2.13, indicating a decline under traditional instruction. For Autonomy, post-test means increased in Exp 1 (M = 3.89) and Exp 2 (M = 3.64), compared to modest gains in control groups. A similar pattern was evident for Social Relatedness, with Exp 1 reaching M = 4.18, substantially higher than controls. These descriptive trends suggest that cooperative learning strategies positively influenced students' motivation.

4.2 Multivariate Test Findings

To evaluate the effect of cooperative learning on learning motivation, a mixed-design multivariate analysis of variance (MANOVA) was conducted with one between-subjects factor (Group: Control 1, Control 2, Exp 1, Exp 2) and one within-subjects factor (Test Phase: Pre-test, Post-test). The dependent variables were learning attitude (LA), autonomy (AU), social relatedness (SR), and overall motivation.

Table 2: Multivariate Test Findings

	Effect	Value	F	Hypothesis df	Error df	Sig.	Partial η^2
Group	Pillai's Trace	0.294	3.230	12	357.0	.000	.098
	Wilks' Lambda	0.726	3.320	12	309.8	.000	.101
	Hotelling's Trace	0.350	3.375	12	347.0	.000	.105
	Roy's Largest Root	0.251	7.468	4	119.0	.000	.201
Test	Pillai's Trace	0.306	12.891	4	117.0	.000	.306
	Wilks' Lambda	0.694	12.891	4	117.0	.000	.306
	Hotelling's Trace	0.441	12.891	4	117.0	.000	.306
	Roy's Largest Root	0.441	12.891	4	117.0	.000	.306
Group × Test	Pillai's Trace	0.500	5.279	12	357.0	.000	.151
	Wilks' Lambda	0.606	5.885	12	309.8	.000	.166
	Hotelling's Trace	0.700	6.414	12	347.0	.000	.182
	Roy's Largest Root	0.600	16.975	4	119.0	.000	.363

The multivariate results demonstrated a statistically significant main effect of group, Wilks' $\Lambda = 0.726$, $F(12, 309.8) = 3.32$, $p < .001$, partial $\eta^2 = .101$, indicating that motivational outcomes differed significantly across instructional groups. A significant main effect of test time was observed, Wilks' $\Lambda = 0.694$, $F(4, 117) = 12.89$, $p < .001$, partial $\eta^2 = .306$, suggesting that motivation scores changed significantly from pre- to post-test across all participants. Most importantly, the group × test interaction was statistically significant, Wilks' $\Lambda = 0.606$, $F(12, 309.8) = 5.89$, $p < .001$, partial $\eta^2 = .166$, indicating that the pattern of change in motivation over time was dependent on the instructional method. The partial eta squared value of .166 for the interaction points to a moderate-to-large effect size, supporting the practical significance of the instructional approach.

4.3 Tests of Between-Subjects Effects

To further explore the individual effects on each dimension of motivation, a series of univariate ANOVAs was conducted.

Table 3: Tests of Between-Subjects Effects

Source	Dependent Variable	Type III SS	df	Mean Square	F	Sig.	Partial η^2
Test	LA	0.195	1	0.195	0.546	.461	.005
	AU	6.915	1	6.915	44.244	.000	.269
	SR	2.902	1	2.902	16.065	.000	.118
	Motivation	1.542	1	1.542	14.489	.000	.108
Group	LA	4.656	3	1.552	4.339	.006	.098
	AU	3.427	3	1.142	7.310	.000	.155
	SR	2.838	3	0.946	5.237	.002	.116
	Motivation	2.567	3	0.856	8.038	.000	.167
Test × Group	LA	21.841	3	7.280	20.356	.000	.337
	AU	3.427	3	1.142	7.310	.000	.155
	SR	1.799	3	0.600	3.319	.022	.077
	Motivation	4.222	3	1.407	13.221	.000	.248
Error	LA	42.918	120	0.358			
	AU	18.754	120	0.156			
	SR	21.676	120	0.181			
	Motivation	12.773	120	0.106			

For Learning Attitude, the test effect was not significant, $F(1, 120) = 0.546$, $p = .461$, but the group effect was significant, $F(3, 120) = 4.339$, $p = .006$, and a significant interaction was observed, $F(3, 120) = 20.356$, $p < .001$, partial $\eta^2 = .337$, demonstrating that change in LA scores over time depended on instructional approach. Autonomy showed a significant main effect of test, $F(1, 120) = 44.244$, $p < .001$, partial $\eta^2 = .269$, and a significant interaction, $F(3, 120) = 7.310$, $p < .001$. Social Relatedness yielded significant effects for test, $F(1, 120) = 16.065$, $p < .001$, group, $F(3, 120) = 5.237$, $p = .002$, and their interaction, $F(3, 120) = 3.319$, $p = .022$. Overall Motivation demonstrated significant differences across all sources, with the interaction effect being highly significant, $F(3, 120) = 13.221$, $p < .001$, partial $\eta^2 = .248$.

4.4 Estimated Marginal Means and Pairwise Comparisons

Table 4: Estimated Marginal Means by Group

Dependent Variable	Group	Mean	Std. Error	95% Confidence Interval
LA	Control 1	2.7	0.106	[2.5, 2.9]
	Control 2	2.9	0.106	[2.6, 3.1]
	Exp 1	3.2	0.106	[3.0, 3.4]
	Exp 2	2.9	0.106	[2.7, 3.1]
AU	Control 1	3.1	0.070	[3.0, 3.3]
	Control 2	3.0	0.070	[2.9, 3.2]
	Exp 1	3.4	0.070	[3.3, 3.6]
	Exp 2	3.3	0.070	[3.2, 3.5]
SR	Control 1	3.5	0.075	[3.3, 3.6]
	Control 2	3.6	0.075	[3.5, 3.8]
	Exp 1	3.8	0.075	[3.7, 4.0]
	Exp 2	3.8	0.075	[3.7, 3.9]

Motivation	Control 1	3.2	0.058	[3.1, 3.3]
	Control 2	3.3	0.058	[3.2, 3.4]
	Exp 1	3.6	0.058	[3.5, 3.7]
	Exp 2	3.5	0.058	[3.4, 3.6]

Post hoc pairwise comparisons using Least Significant Difference (LSD) revealed that for Learning Attitude, Exp 1 significantly outperformed all other groups: compared to Control 1 ($p = .001$), Control 2 ($p = .015$), and Exp 2 ($p = .039$). For Autonomy, significant differences emerged between Exp 1 and both control groups (Control 1: $p = .003$; Control 2: $p < .001$), as well as between Exp 2 and Control 2 ($p = .003$). For Social Relatedness, both experimental groups scored significantly higher than Control 1 (Exp 1: $p = .001$; Exp 2: $p = .002$), and Exp 1 also scored significantly higher than Control 2 ($p = .044$). For Overall Motivation, Exp 1 scored significantly higher than both control groups (Control 1: $p < .001$; Control 2: $p = .001$), and Exp 2 also outperformed Control 1 ($p = .002$) and Control 2 ($p = .039$).

4.4 Estimated Marginal Means for Group × Test Interaction

Table 5: Estimated Marginal Means for Group × Test Interaction

Dependent Variable	Group	Pre-test Mean	Post-test Mean
LA	Control 1	3.275	2.125
	Control 2	3.075	2.638
	Exp 1	2.675	3.775
	Exp 2	2.825	3.000
AU	Control 1	3.000	3.297
	Control 2	3.000	3.031
	Exp 1	3.000	3.891
	Exp 2	3.000	3.641
SR	Control 1	3.409	3.511
	Control 2	3.523	3.693
	Exp 1	3.472	4.176
	Exp 2	3.688	3.915
Motivation	Control 1	3.294	3.122
	Control 2	3.306	3.297
	Exp 1	3.178	3.963
	Exp 2	3.334	3.609

The interaction means reveal that Experimental Group 1 demonstrated the largest increases across all motivation components, particularly in Learning Attitude (from 2.675 to 3.775) and Social Relatedness (from 3.472 to 4.176), while Control Group 1 showed notable declines in Learning Attitude and overall motivation.

Figure 1: Profile plot showing the estimated marginal means of overall motivation across groups from pre-test to post-test

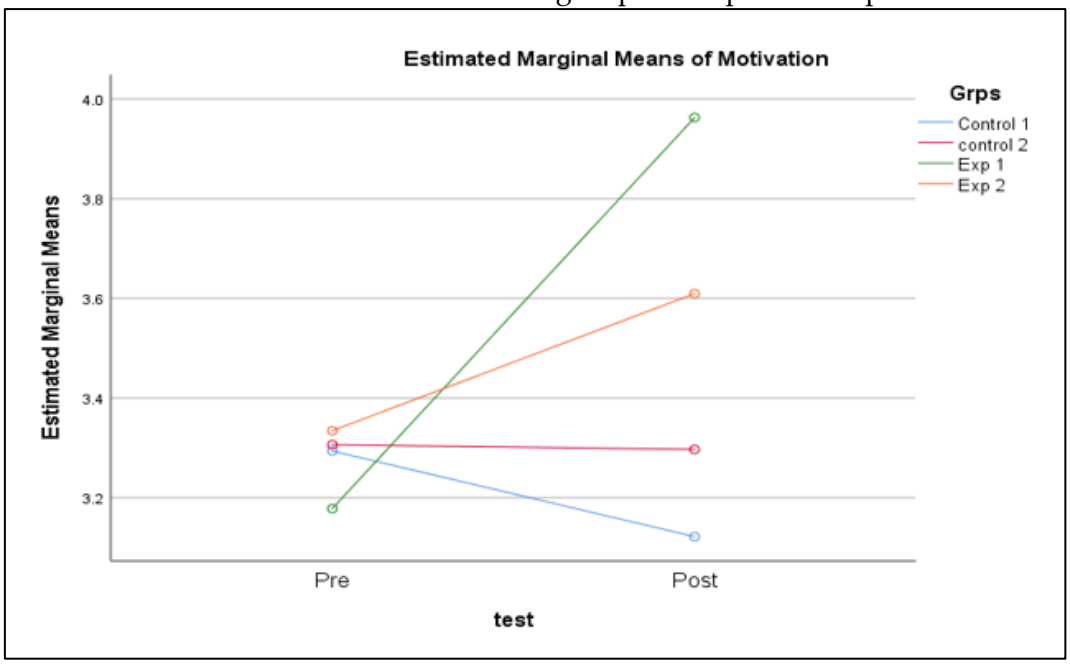


Figure 4.2: Profile plot showing the estimated marginal means of learning attitude across groups from pre-test to post-test

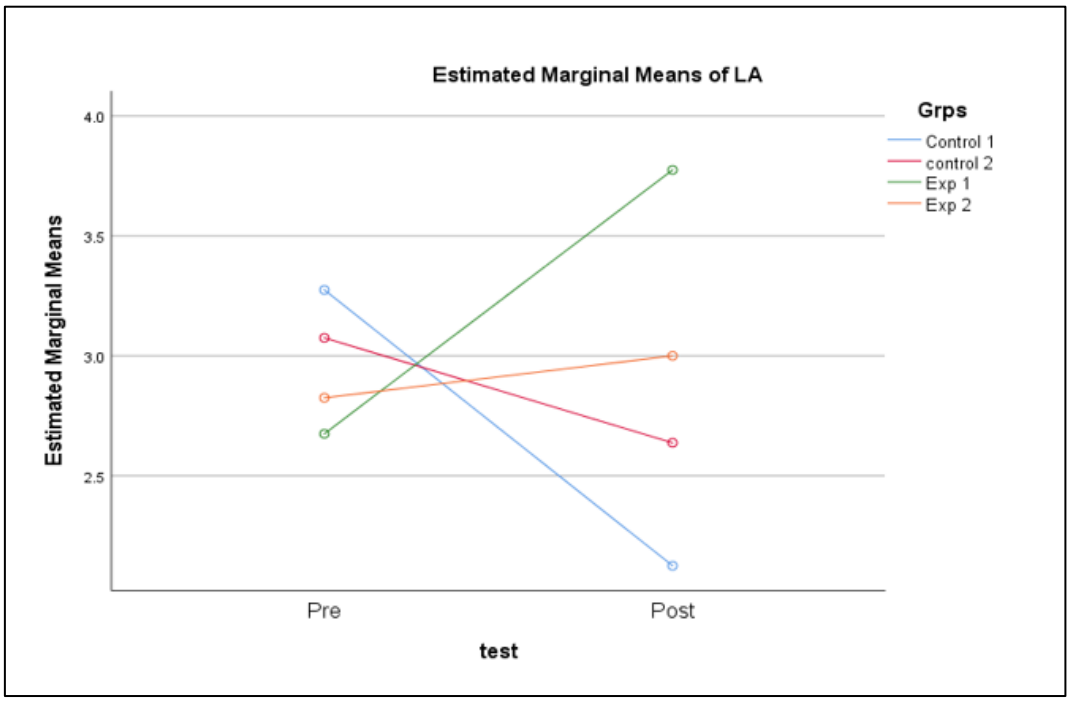


Figure 4.3: Profile plot showing the estimated marginal means of autonomy across groups from pre-test to post-test

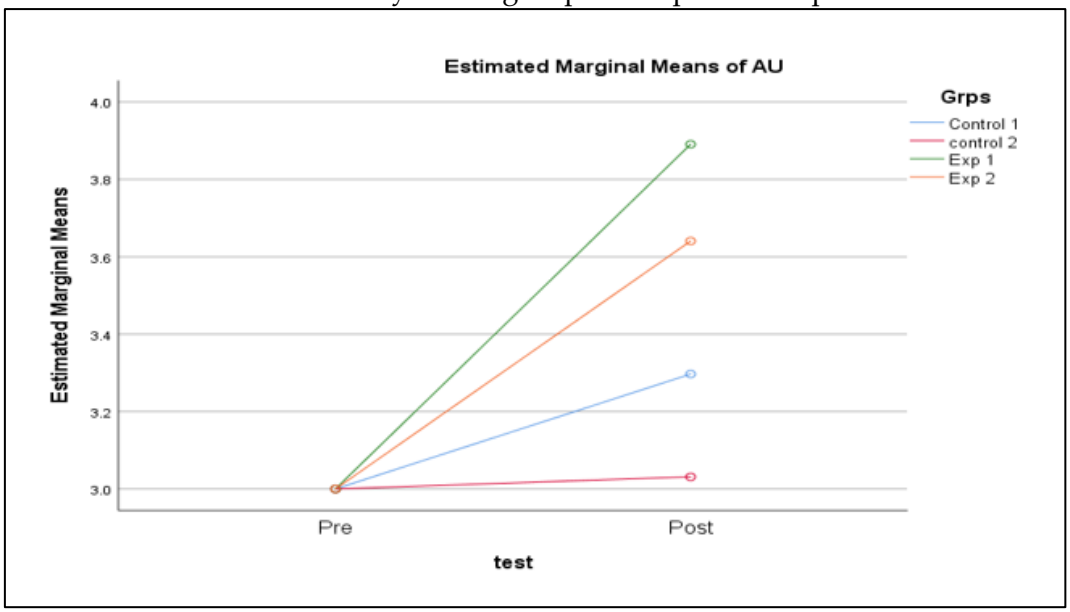
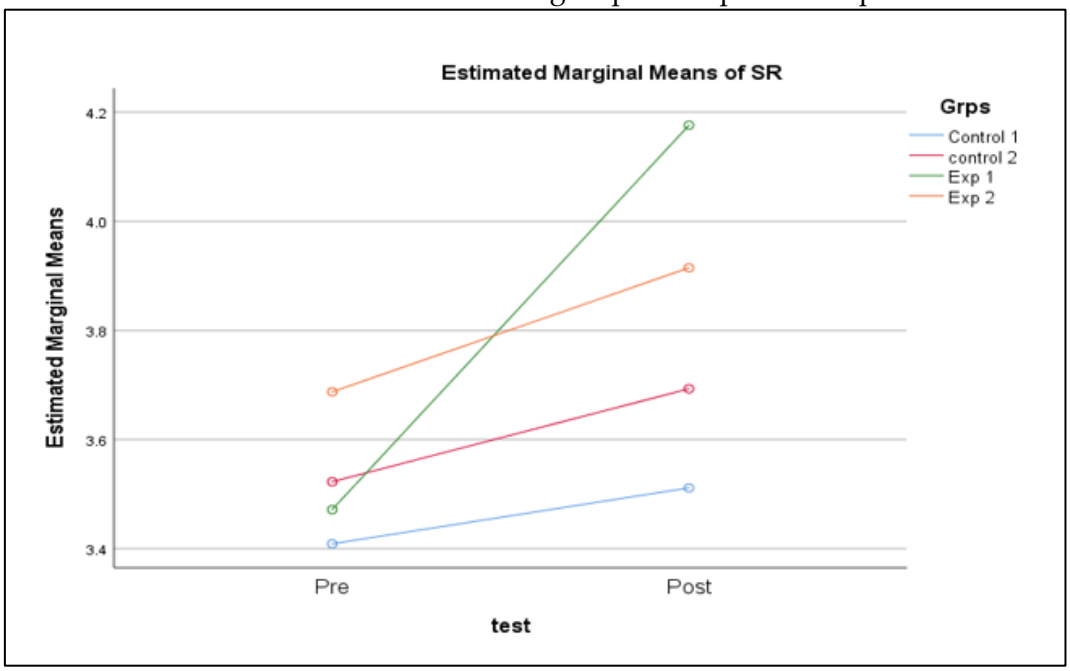


Figure 4.4: Profile plot showing the estimated marginal means of social relatedness across groups from pre-test to post-test



In conclusion, the research question aimed to investigate whether cooperative learning strategies lead to significant improvements in learning motivation—specifically attitude, autonomy, and social relatedness—compared to traditional teaching methods among beginner piano students. The multivariate analysis revealed a statistically significant interaction effect between group and time across the combined motivation variables, Wilks' $\Lambda = 0.606$, $F(12, 309.8) = 5.885$, $p < .001$, partial $\eta^2 = .166$. This finding

indicates that the pattern of motivational change over time varied significantly between instructional groups. Univariate analyses confirmed significant interaction effects for all motivation components, with Experimental Group 1 (Reciprocal Peer Tutoring) demonstrating the largest gains. Pairwise comparisons consistently showed that both experimental groups, particularly Exp 1, significantly outperformed control groups across all motivation dimensions. These findings provide strong evidence that cooperative learning methods, especially RPT, are more effective than traditional instruction in enhancing beginner piano students' learning motivation, autonomy, and social relatedness.

The findings of this study indicate that cooperative learning had a significant positive effect on beginner piano students' learning motivation compared with traditional teacher-centered instruction. The MANOVA results revealed significant effects of instructional group, test time, and the interaction between group and test, suggesting that students' motivation changed over time and that these changes depended on the teaching method. These findings align with cooperative learning theory, which emphasizes that structured peer interaction and shared learning goals can enhance students' engagement and attitudes toward learning (Johnson *et al.*, 2014; Slavin, 1995). Previous research has similarly shown that cooperative learning improves students' academic motivation and learning attitudes across educational contexts (Hattie, 2009; Kyndt *et al.*, 2013).

The improvement in overall motivation observed in the experimental groups supports previous research suggesting that collaborative learning environments increase students' participation and engagement in classroom activities. In music education, collaborative approaches have been shown to enhance students' interest and involvement in learning by encouraging interaction and shared musical experiences (Creech *et al.*, 2022; Sun *et al.*, 2024). The present findings extend this literature by demonstrating that cooperative learning strategies can effectively enhance motivation in beginner piano instruction.

The results are also consistent with Self-Determination Theory, which proposes that motivation is influenced by the satisfaction of three basic psychological needs: autonomy, competence, and relatedness (Ryan & Deci, 2000; Ryan & Deci, 2020). In this study, cooperative learning appears to have created a learning environment that supported these needs. Students in the experimental groups showed significantly higher autonomy and social relatedness scores than those in the control groups, indicating that collaborative activities encouraged students to take a more active role in their learning while strengthening peer interaction. Similar findings have been reported in music education research, where collaborative learning environments promote self-regulated learning and stronger social connections among students (Biasutti & Concina, 2023).

The significant improvement in social relatedness in the experimental groups highlights the importance of peer interaction in music learning contexts. Musical learning often involves collaboration and shared practice experiences, and cooperative learning structures may strengthen students' sense of belonging and support within the classroom

(Creech *et al.*, 2022). These social interactions can enhance students' motivation by creating a more supportive and engaging learning environment.

Overall, the findings suggest that cooperative learning strategies—particularly those involving structured peer interaction such as Reciprocal Peer Tutoring—can significantly enhance students' motivation in beginner piano education. Compared with traditional teacher-centered instruction, cooperative learning appears to provide a more engaging and supportive learning environment that promotes autonomy, strengthens peer relationships, and encourages positive attitudes toward learning piano. These results support previous research in both general education and music education and highlight the potential of cooperative learning as an effective pedagogical approach for university-level piano instruction.

5. Recommendations

Based on the findings of this study, it is recommended that cooperative learning strategies be incorporated more systematically into group piano instruction in higher education. Piano instructors should consider using structured collaborative approaches such as Reciprocal Peer Tutoring (RPT), Jigsaw II, and Teams-Games-Tournament (TGT) to increase students' motivation, encourage peer interaction, and promote greater learner autonomy. Universities and music departments may also support this process by providing professional development opportunities that help instructors effectively implement cooperative learning methods in music classrooms. In addition, curriculum designers should integrate collaborative activities into group piano courses to create more engaging and interactive learning environments. Future research is recommended to examine the long-term effects of cooperative learning on students' motivation and musical development, as well as to explore its application in other areas of music education and with different learner populations.

6. Conclusion

This study examined the effect of cooperative learning on learning motivation among beginner piano students in higher education. The findings demonstrate that cooperative learning strategies significantly enhanced students' motivation compared with traditional teacher-centered instruction. In particular, students who participated in cooperative learning activities showed greater improvements in autonomy, social relatedness, and overall motivation, while also maintaining more positive learning attitudes. These results support the theoretical perspectives of cooperative learning and Self-Determination Theory, suggesting that collaborative learning environments can better satisfy students' psychological needs and promote stronger engagement in musical learning. Overall, the study highlights the pedagogical value of integrating cooperative learning approaches into group piano instruction, indicating that structured peer

interaction and collaborative learning activities can create more motivating and supportive learning environments for beginner piano students in higher education.

Conflict of Interest Statement
The authors declare no conflicts of interest.

About the Author(s)
Xin Zhao is a PhD researcher in the Faculty of Music and Performing Arts at Sultan Idris Education University (UPSI), Malaysia. His research interests focus on piano pedagogy, cooperative learning in music education, and motivational factors in instrumental learning. His current research explores innovative teaching strategies that enhance learning motivation and musical development among beginner piano students in higher education.
Dr. Huey Yi @ Colleen Wong is a senior academic in the Faculty of Music and Performing Arts, Sultan Idris Education University (UPSI), Malaysia. Her research interests include music education, piano pedagogy, collaborative learning, and educational psychology in music learning contexts. She has extensive experience in teaching, research, and supervising postgraduate students in music education and performing arts.

References

Biasutti, M., & Concina, E. (2023). Collaborative learning in instrumental music education: Effects on students' engagement and self-regulated learning. *Frontiers in Psychology, 14*. https://doi.org/10.3389/fpsyg.2023.1122334

Burnard, P., & Murphy, R. (2022). Developing collaborative creativity in music education. *Thinking Skills and Creativity, 44*. https://doi.org/10.1016/j.tsc.2022.101015

Cavitt, M. E. (2022). Student motivation and engagement in music ensembles: Implications for music educators. *Journal of Research in Music Education, 70*(3), 347–362. https://doi.org/10.1177/00224294221088921

Cavitt, M. E. (2022). Student motivation and engagement in music ensembles: Implications for music educators. *Journal of Research in Music Education*, 70(3), 347–362. https://doi.org/10.1177/00224294221088921

Creech, A., Hallam, S., Varvarigou, M., & McQueen, H. (2022). Active music-making and collaborative learning in higher education. *International Journal of Music Education, 40*(3), 441–455. https://doi.org/10.1177/02557614221084180

Evans, P., & Liu, S. (2023). Student engagement and motivation in music learning environments: Implications for classroom practice. *Research Studies in Music Education*, 45(2), 321–336. https://doi.org/10.1177/1321103X221137991

Fredriksson, K., & Ferm Thorgersen, C. (2024). Teaching and learning in music education: A meta-synthesis of qualitative studies on teachers' support of students' musical learning. *Music Education Research, 26*(2), 178–194. https://doi.org/10.1080/14613808.2024.2319579

Fredriksson, K., & Ferm Thorgersen, C. (2024). Teaching and learning in music education: A meta-synthesis of qualitative studies on teachers' support of students' musical learning. *Music Education Research*, 26(2), 178–194. https://doi.org/10.1080/14613808.2024.2319579

Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge. https://doi.org/10.4324/9780203887332

Johnson, D. W., Johnson, R. T., & Smith, K. A. (2014). Cooperative learning: Improving university instruction by basing practice on validated theory. *Journal on Excellence in College Teaching, 25*(3–4), 85–118. Retrieved from http://static.pseupdate.mior.ca.s3.amazonaws.com/media/links/Cooperative_learn_validated_theory.pdf

Kiss, B. (2025). Students' motivation for classroom music: A systematic literature review. *Education Sciences*, 15(7), 862. https://doi.org/10.3390/educsci15070862

Kyndt, E., Raes, E., Lismont, B., Timmers, F., Cascallar, E., & Dochy, F. (2013). A meta-analysis of the effects of face-to-face cooperative learning. *Educational Research Review, 10*, 133–149. https://doi.org/10.1016/j.edurev.2013.02.002

Niemiec, C. P., & Ryan, R. M. (2009). Autonomy, competence, and relatedness in the classroom: Applying self-determination theory to educational practice. *Theory and Research in Education, 7*(2), 133–144. https://doi.org/10.1177/1477878509104318

Pike, P. D. (2017). *Dynamic group-piano teaching: Transforming group theory into teaching practice*. Routledge. Retrieved from https://www.routledge.com/Dynamic-Group-Piano-Teaching-Transforming-Group-Theory-into-Teaching-Practice/Pike/p/book/9781138241435

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology, 25*(1), 54–67. https://doi.org/10.1006/ceps.1999.1020

Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective. *Contemporary Educational Psychology, 61*, 101860. https://doi.org/10.1016/j.cedpsych.2020.101860

Sun, B., Rauduvaitė, A., Sun, H., & Yao, Z. (2024). Cooperative learning strategies in music education: Optimization and improvement of learning strategies. *Education Sciences*, *14*(2), 211. https://doi.org/10.3390/educsci14020211

Zhao, X., & Wong, H. Y. C. (2024). A literature review of cooperative learning in music education. *International Journal of Academic Research in Progressive Education and Development*, *13*(3), 2595–2606. https://doi.org/10.6007/IJARPED/v13-i3/22272