Effects of Cooperative Learning Strategies on the Music Achievement of Beginning Instrumentalists

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ABSTRACT
The purpose of this study was to determine the effects of cooperative learning strategies on the music achievement of beginning instrumental music students. The posttest 2 x 2 x 3 factorial design involved forty-six fifth- and sixth-grade students in a 20-week treatment during instrumental lessons. Learning the same music, experimental groups received direct instruction paired with cooperative learning opportunities while control groups received only direct instruction. Data gathered included subtest scores from the Music Aptitude Profile and a recorded posttest performance consisting of three études under three different conditions. A significant main effect was only found for étude condition. Limitations that precluded expected results from this investigation include maturation, prior training, and repeated measures. Students in instrumental music ensembles are typically unfamiliar with talking in a rehearsal and may need "untraining" to promote cooperation before further investigations of cooperative learning.

Keywords: *Cooperative learning, instrumental music, music education, beginning band, collaborative learning*

1. Introduction

Historically, school instrumental music instruction has occurred in a group setting. Traditional school lessons and ensemble rehearsals consist of one teacher using a direct instruction approach with a group of students (Allsup, 2003; Mantie & Tucker, 2008). Though students are in a group, it is not necessarily accurate to describe the students as "working" together, i.e. independently collaborating or cooperating. Typically a teacher conducts and leads a school music ensemble, making all musical decisions and leading all music making. As a result of this teacher-centered approach, students may rarely have the opportunity to independently think in music because they are always told what to do, never learning to truly work together

or acquire skills to collaboratively make music. Exclusive use of teacher-driven, instructional strategies limits the formation of skill development in learning and working independently because information delivery becomes centered on the teacher's pace of instruction rather than the individual learner's pace of comprehension.

Elliott (1995) believes that it is crucial for students to make musical judgments in action and that through this process students may develop informal musical knowledge through active musical problem solving. By investigating the link between school music experiences and life-long music making, Mantie and Tucker (2008) identified two major problems; 1) students do not view their learning as co-participating in a real, 'in-the-world' social practice, and 2) teachers do not view their teaching as leading toward the goal of life-long participation. Elliott (1995) also suggests the importance of the ability to reflect critically in action, meaning that students should learn when and how to make musical judgments, a skill not always developed in the full ensemble rehearsal. Student decision-making and problem solving should eventually occur independently as a result of instruction in any school curriculum.

Both theoretical and empirical literature suggest that simply having students work together - generic collaborative instruction - lacks the fundamental elements needed to prevent the negative effects group-learning structures can have on individual learning (Johnson, Johnson, & Holubec, 1994a; Kagan, 1997). Kagan (1997) describes careful structuring of cooperative learning activities so that all students contribute to the group through participation and elaboration, thereby increasing understanding through verbal processing. Student-to-student interaction in small, heterogeneous learning groups, with individuals helping each other, is common to all versions of cooperative learning. Each group is a microcosm of the whole class in academic achievement, gender, ethnicity, and race. In cooperative learning, students learn actively while the teacher becomes a facilitator in the learning process.

Little is known about the effects of cooperative learning strategies on music achievement. An informational book about cooperative learning by Kaplan and Stauffer (1994) includes lesson plans and other ideas for implementing cooperative learning strategies in music classes and ensembles. Nevertheless, the research cited in support of cooperative learning by Kaplan and Stauffer is strictly academic-subject based. Learning to read music cooperatively in a choral music setting was investigated by Inzenga (1999) as a case study consisting of two study teams of ninth-grade girls. Inzenga found achievement gains in music reading using the *Iowa Tests of Music Literacy* as a posttest and concluded that using cooperative learning strategies in a study group setting is an effective alternative for teaching chorus students to read music. In general music settings, Wiggins (2000) concludes that individual student initiation of musical ideas is strengthened when they are required to explain, justify, defend, and/or alter them to accommodate someone else's viewpoint.

Opportunities for instrumentalists to interact with each other in a cooperative setting, though not widely investigated, may reasonably serve multiple purposes in developing independent musicianship including (a) extra practice for each individual, (b) assessment and prescriptive feedback from peers, (c) high percentage of engagement, (d) small ensembles meeting more individual musical needs, (e) encouragement of divergent thinking and multiple solutions to a question or task and, (f) building understanding leading to mastery through elaboration and discourse. The chamber music ensemble setting may provide students with the opportunity to develop informal musical knowledge with more chances to make musical decisions. Larson (2010) suggests that perhaps by engaging learners to cooperatively make decisions in the processes of creating, performing, and responding to music, educators may be able to more effectively address individual musical needs in an instrumental music setting. Including structured student interaction in the classroom may contribute to an increase in individual musical achievement. However, little empirical evidence exists to substantiate the idea that engaging instrumental music students in cooperative

learning activities will contribute to improved individual music performance achievement.

The purpose of this study is to investigate the effects of structured cooperative learning strategies on the music achievement of beginning instrumentalists. It is hypothesized that students who work in cooperative groups will attain a significantly higher level of performance achievement than students in the control groups. The specific research questions are: (a) Do structured cooperative learning strategies that include discussion and elaboration, affect the performance achievement of fifth- and sixth-grade instrumental music students? (b)Is music aptitude a factor in the performance achievement of students who participate in cooperative learning activities?

2. Method

Forty-six fifth- and sixth-grade instrumental music students from four schools in a public school district in northern Connecticut were participants (25 male, 21 female).Student sreceived prior instruction on a woodwind or brass instrument for at least one year participated in the study. All participating students experienced structured cooperative tasks in music for the first time during this investigation. Students participated in one group lesson and one ensemble (concert band) rehearsal per week. All participants used *Standard of Excellence Comprehensive Band Method* Book I (Pearson, 1993) as the primary instructional material.

The four participating teachers are experienced instrumental music educators with limited experience using independent group work in their instrumental music instruction. Prior to the treatment, the researcher taught all teachers how to implement specific cooperative learning strategies in the instrumental music lesson. The following cooperative learning models, developed by Kagan (1997), were used: *Timed Pair Share; Rally Robin; Round Robin; Poems for Two Voices; Rally Coach.*

The *Musical Aptitude Profile* (MAP) (Gordon, 1995) T1 and R2 subtests were used to determine high and low levels of stabilized music aptitude. An acceptable amount of variance is accounted for by using these two subtests to distinguish different levels of music aptitude. Three études, composed by the researcher based on the curriculum and the material from *Standard of Excellence Comprehensive Band Method* Book 1 (Pearson, 1993), were used to measure the participants' instrumental music performance achievement after the 20-week treatment. Three rubrics describing specific performance criteria designed by the researcher were used to assess student performances (a) tonal—melody, (b) rhythm, and (c) expression.

Using intact lesson-groups preformed by the participating teachers, the researcher randomly assigned lesson groups to the experimental or control group. Nine lesson groups participated; five experimental treatment groups and four control groups. All participating students were taught in instrumental lesson groups comprising three to seven pupils, with each group receiving one 30-minute period of instruction per week.

Prior to treatment, all students in the instrumental ensemble were administered subtests of the MAP (Gordon, 1995) to measure levels of music aptitude. The students were then engaged in a 20-week treatment that consisted of 20 sequential units, with treatment occurring only during instrumental lessons. The purpose of each lesson was to develop instrumental music achievement through performance mastery of brief songs performed from notation. Each treatment portion of the lesson began with a brief direct instruction component. While engaged in direct instruction, the teacher addressed a specific tonal or rhythm objective to the whole group using material from *Standard of Excellence Comprehensive Band Method* Book I,such as scale or rhythm activities, technique building, and/or music reading activities.

Following the direct instruction component, control and experimental groups engaged in different learning strategies. For approximately five minutes, the students in the experimental-group were assigned to use a specific cooperative learning strategy while the control-group students continued to work in a whole-

group, direct-instruction model without independent student interaction. At the end of the lesson period, all students came back together and completed a reflection worksheet, self-assessing their own level of performance. These worksheet criteria became the basis for the dimensions and criteria found in the posttest assessment for this investigation. The lessons ended with the entire lesson group performing the song together with the teacher providing comments for improvement. Lessons were periodically observed by the researcher to maintain reliability and consistency of instructional methods.

At the end of the 20-week treatment period, all of the students individually performed and audio recorded three études. The first étude was used as lesson material during the last week of the treatment. The second étude was distributed one week prior to the performance assessment for individual preparation without assistance. The third étude was unfamiliar and sight-read by each student participant during the posttest. The performance recordings were copied to a master tape in random order to conceal student identities.

Three judges independently rated the recorded student performances on three separate occasions, with each occasion focusing on the following dimensions: Tonal – melodic contour, Rhythm, and Expression (46 participants x 3 études x 3 dimensions = 414 ratings) by each judge. All judges were music education graduate students who have taught in the public schools and have had prior experience using scoring rubrics in the measurement of student performance achievement.

Students whose total raw scores on T1 and R2 combined were greater than or equal to 56 (corresponding approximately to the 58th percentile and higher) were identified as high aptitude. In contrast, those with total raw scores on T1 and R2 combined of less than 56 were identified as low-aptitude students.

A three-dimensional (2x2x3) mixed posttest design with treatments and levels of aptitude as between-subject factors and type of étude preparation as a within-subject factor was used for this investigation. Group mean differences were examined on scores on (a) étude performances between students with high and low music aptitude, and (b) between students who did and did not engage in cooperative learning during the treatment. A three-factor analysis of ANOVA with repeated measures on the last factor was used to examine main and interaction effects among the three factors.

3. Results

Listed in Table 1 are the means, standard deviations (SD), split-half *r*, and KR-20 reliability coefficients for the tonal, rhythm, and composite scores for the MAP subtests. The split-half reliability coefficients were comparable to those reported for the standardization sample in the MAP manual (Gordon, 1995). The Tonal Imagery—Melody coefficient was somewhat lower than the reported coefficient reported in the MAP manual but still fell within an acceptable range.

Presented in Table 2 are the interjudge reliabilities (Pearson *r*) and alpha coefficients for Études 1, 2 and 3. The alpha coefficients of all three études are exceptionally high. Each judge's ratings for the tonal, rhythm, and expression dimensions were summed into a total score for each étude. The total scores for each étude and each judge were then summed into a composite score for each étude that was used for the analysis.

Shown in Table 3 are the combined étude performance means and standard deviations for the experimental and control groups. Means and standard deviations are reported for low- and high-aptitude students, as well as the overall composite étude performance ratings. Overall, the experimental group means are observed to be consistently higher than the control group means on all étude conditions. In examining performance results for the different levels of music aptitude, observed means for high-aptitude students were higher than the means for low-aptitude students in the three étude conditions. On études 1 and 3, high-aptitude students in the experimental group achieved slightly higher means than did high aptitude students in the control group. However, the mean for the high-aptitude students in the control group is slightly higher on

étude 2 than that of high-aptitude students in the experimental group. The mean ranges between low-aptitude students in the experimental and control group are noticeably larger than the mean range between the high-aptitude students in the experimental and control groups.

Étude condition means show only a slight difference between the teacher-prepared condition and the student-prepared condition. The sight-reading condition mean was lowest of the three. The range between treatment condition means for high-aptitude students is markedly small, whereas the range between the treatment condition means for the low-aptitude students is systematically larger. High-aptitude students in the experimental group exhibited a slight difference between overall means for études 1 and 2; the difference between control group means for études 1 and 2 is negligible.

Results of the three-way analysis of variance of the composite student performance ratings for each of the three études are presented in Table 4. Neither the three-way interaction nor any of the two-way interactions were statistically significant. No statistically significant differences were found between treatment groups. However, as would be expected, a significant difference was found between levels of aptitude ($p < .05$). Students with high levels of music aptitude achieved significantly higher ratings on all types of études than did students with low levels of music aptitude. There was also a significant main effect for étude conditions ($p < .05$). Three *t* tests, using a Bonferroni corrected *p* value of .0167 (.05/3), revealed a statistically significant difference between ratings for the teacher-assisted étude and the sight-read étude. An observed difference was also found between student-prepared étude and sight-reading ($p < .05$, uncorrected). No significant difference was found between the teacher-assisted étude and student-prepared étude.

4. Discussion

The lack of statistical difference in beginning student instrumental music performance between students engaged and not engaged in cooperative learning activities is an unanticipated result of this research. A variety of design or procedural elements could have affected the lack of a treatment effect in favor of cooperative learning activities. With a limited number of participants in a multifactoral design, it is a challenge to reveal any differences that may exist because of limited statistical power. In addition, the limited amount of teaching time (30 minutes, once per week for 20 weeks) may not have been sufficient for students to reach a higher level of instrumental music performance achievement. This is a limitation associated with instrumental music instruction in general, and is not a problem exclusive to this investigation.

When considering the lack of significant findings for the treatment, it is also important to consider the teacher training. Unlike both experiments by Alexander and Dorow (1983) as well as the study by Inzenga (1999), the present investigation sought to control teacher bias by not having the researcher instruct the participants. However, limited teacher training may have been a factor in the effectiveness of this study. Teachers participated in two 2-hour training sessions. It is possible that the amount of teacher training was not sufficient to provide the level of understanding and confidence needed by teachers to effectively and consistently apply the structured cooperative strategies in the lessons. Implementing the cooperative learning strategies necessary for this study was a new instructional paradigm for the participating instrumental music teachers. Perhaps more training and an opportunity to pilot the teaching strategies before the study began would have been a more effective way to implement these new instructional strategies.

Results of this investigation may reveal possible violations of established cooperative learning components. Evidence from videotaped lessons, observations, and informal teacher commentary reveal that students, though responsibly completing the assigned tasks, worked more as individuals and less as interdependent groups or pairs. Students were observed to minimally interact through desired verbal processing techniques embedded in the cooperative learning structures, thereby compromising the

effectiveness of the learning strategy. A vital component of this study was to elicit student interaction and verbal responses. The tenet of verbal processing through active elaboration did not occur as effectively as planned. Students were inexperienced in purposeful, on-task verbal interaction during instrumental music lessons and were reticent to share ideas and coach each other to improve their individual instrumental music performance levels.

Studies by Webb (1982, 1992) advocate the benefits and effectiveness of verbal processing in cooperative learning. In instrumental music programs, however, students are typically instructed to not talk, sing, or perform on an instrument until the teacher calls on an individual or group. Students are instructed as described in order to maintain reasonable sound levels and classroom management. If students are trained not to interact from the beginning of their instruction, cooperative learning becomes a major obstacle that goes against established class directives. Perhaps rules for classroom management established in instrumental music instruction need to accommodate student behaviors necessary for group interaction if cooperative learning is to be used as an instructional strategy.

5. Conclusion

Overall, when students practice and prepare for a performance, either with teacher assistance or working cooperatively with peers, they appear to develop similar skills and instrumental music proficiencies. This is a preliminary conclusion based on beginning instrumental music students who receive group instruction once a week. Future research should investigate the effects of cooperative learning with older, more technically proficient instrumental music students. An investigation focusing on instrumental music learning through cooperative learning at the secondary level would also provide a researcher many opportunities for treatment implementation because of the greater frequency of class meetings than at the primary level. Older students with greater ability to verbalize specific aspects of instrumental music performance may benefit from cooperative learning to a greater degree than elementary school-aged students.

Future investigations of how cooperative learning affects student music achievement may need to consider a repeated-measures procedural design that assesses student learning multiple times throughout the treatment. This design may provide the intrinsic motivation missing in the present study. Students who are frequently and meaningfully assessed may show an increased desire to improve their performance on an instrument. Furthermore, students who are frequently assessed both as individuals and in a group may display more motivation to coach underachievers in their cooperative group as well as develop a careful awareness of their own progress. Investigating the effects of intrinsic and extrinsic motivational factors in cooperative learning on music achievement could give more direction on how to effectively implement cooperative learning strategies in instrumental music education.

The effectiveness and contribution of cooperative learning strategies to student instrumental music learning has yet to be discovered. With the amount of empirical evidence documenting the positive effects of cooperative learning in several other areas of instruction, it is reasonable to suggest that cooperative learning may have some benefit to instrumental music achievement. Many factors associated with instrumental music learning are already in place for group learning and student interaction to occur. It is up to music researchers to investigate the most effective instructional strategies that take advantage of the grouping that naturally occurs in instrumental music ensembles.

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Table 1

Means and Standard Deviations for the Tonal, Rhythm, and Composite Raw Scores of the Musical Aptitude Profile

MAP RawScore	Mean	SD	Split-half*r*	KR-20
T1	27.93	4.01	0.64	0.53
R2	26.96	5.64	0.69	0.77
Composite	54.89	8.14	0.7	0.77

Table 2

Interjudge Reliability Coefficients (Pearson r) for Tonal, Rhythm, and Composite Étude Performance Ratings

Teacher-Prepared Étude 1			Interjudge		Alpha
	M	*SD*	J1	J2	
Judge 1	29.9	7.1	--		
Judge 2	27.7	6.2	.93	--	
Judge 3	27.6	7.0	.90	.88	
Alpha			--	--	.97
Student-Prepared Étude 2					
	M	*SD*	J1	J2	
Judge 1	29.2	7.0	--		
Judge 2	28.2	6.6	.93	--	
Judge 3	26.6	7.3	.91	.94	
Alpha			--	--	.97
Sight-Read Étude 3					
	M	*SD*	J1	J2	
Judge 1	27.3	6.0	--		
Judge 2	25.8	5.3	.90	--	
Judge 3	26.5	6.0	.92	.91	
Alpha			--	--	.95

Table 3

Means and Standard Deviations for the Combined Performance Ratings of the Étude Condition/Treatment Group/Level of Aptitude

	Experimental			Control			Overall		
	N	*M*	*SD*	*n*	*M*	*SD*	*N*	*M*	*SD*
Performance Ratings—Étude 1									
Low Aptitude	13	85.9	18.6	12	71.3	17.2	25	78.9	19.1
High Aptitude	12	93.2	15.2	9	92.1	22.0	21	92.7	17.9
Overall	25	89.4	17.1	21	80.2	21.6	46	85.2	19.6
Performance Ratings—Étude 2									
Low Aptitude	13	84.2	17.1	12	71.0	17.2	25	77.9	18.1
High Aptitude	12	90.2	20.8	9	92.6	22.9	21	91.2	21.2
Overall	25	87.1	18.8	21	80.2	22.1	46	84.0	20.5
Performance Ratings—Étude 3									
Low Aptitude	13	82.5	17.1	12	69.4	16.1	25	76.2	17.6
High Aptitude	12	85.3	18.3	9	81.6	9.6	21	83.7	15.0
Overall	25	83.8	17.4	21	74.6	14.8	46	79.6	16.7

Table 4

Results of the Three-Way Repeated-Measures Analysis of Variance of Composite Ratings for Each Étude

Source	*df*	MS	*F*	*p*
Between Subjects				
Treatment	1	1762.74	2.15	0.150
Aptitude	1	4673.95	5.71	0.021*
Group X Aptitude	1	1387.24	1.70	0.200
Error	42	818.52		
Within Subjects				
Étude	2	448.24	6.33	0.003*
Étude X Group	2	28.30	0.40	0.672
Étude X Aptitude	2	152.87	2.16	0.122
Étude X Group X Aptitude	2	29.56	0.42	0.660
Error (Étude)	84	70.85		

$n = 46$

* $p < .05$