

THE EFFECT OF USING MANIPULATIVES ON THE DIFFERENTIATION
BETWEEN MELODIC ACTIVITY AND TEMPO PERCEPTION

A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF MASTER OF ARTS
IN THE GRADUATE SCHOOL OF THE
TEXAS WOMAN'S UNIVERSITY

COLLEGE OF ARTS AND SCIENCES

BY

CHERYL L. KENDRICK, B.M.

DENTON, TEXAS

DECEMBER 1993

Texas Woman's University
Denton, Texas

8-23-93
Date

To the Associate Vice President for
Research and Dean for Graduate School:

I am submitting herewith a thesis written by Cheryl L. Kendrick, entitled "The Effect of Using Manipulatives to Teach the Differentiation between Melodic Activity and Tempo Perception." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts, with a major emphasis in Music Education.

Janice N. Killian
Janice Killian, Major Professor

We have read this thesis
and recommend its acceptance:

John W. Hohn
Thomas L. Brown
Richard W. Edman
Chair of Department of Performing Arts

Accepted

Leslie M. Thompson
Associate Vice President for
Research and Dean for the
Graduate School

ABSTRACT

THE EFFECT OF USING MANIPULATIVES ON THE DIFFERENTIATION BETWEEN MELODIC ACTIVITY AND TEMPO PERCEPTION

Cheryl Kendrick

December 1993

The purpose of the present investigation was to study the potential influence of using manipulatives to teach tempo perception in the presence of differing levels of melodic activity. Forty-five subjects in fifth-grade were randomly assigned to control and treatment groups by intact classes. Independent variables were melodic activity (a plain melody moving in quarter notes and an ornamented version of the same melody), and tempi (MM=92, and MM=108). Subjects were given a visual beat cue (presenter clapping the steady beat), and a motor response task (clapping the beat with each melody presentation). Subjects indicated whether the second example heard in each pair was "faster," "slower," or "same speed" as the first example. Data consisted of the number of correct responses to each test item. At pretest both groups responded incorrectly to the melodic activity, rather than steady beat, when making tempo

judgments. The treatment group received three class periods of specific instruction on the relationship between tempo, steady beat, and rhythm using manipulatives to visualize abstract concepts. The control group showed no significant pre-post gain as measured by the Wilcoxon Matched Pairs statistic. The treatment group showed a pre- post gain approaching significance. While the current investigation did not achieve significance, results from this study indicate that tempo perception may be effected with some degree of success by teaching with the use of manipulatives.

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CHAPTER I

INTRODUCTION

Tempo is a critical component of music. It is an element in evaluating musical performance, a component of testing for musical talent, and an integral part of music education. Basal music series textbooks and methods often begin with activities that incorporate the concepts of fast, slow, and steady beat (Meske & Pautz, 1988; Staton & Staton, 1988) . It is assumed that these concepts are basic to musical development and are appropriate for children to learn. Inconsistencies in research results have suggested that the correlation between the concepts of tempo, steady beat, and rhythm is more complex than previously perceived.

Review of Literature

As music research has advanced there has been much interest in testing tempo and rhythmic perception. Several tendencies have become evident as a result of replicated and/or extended research: (a) different rhythmic performance levels exist between boys and girls (Gilbert, 1980; Schleuter & Schleuter, 1985), (b) children respond most accurately to rhythmic tasks using patschen, clapping, or playing sticks (Flohr, 1992; Nelson, 1984; Rainbow, 1981; Schleuter & Schleuter, 1985), (c) children's rhythmic

abilities tend to improve with chronological age (Gilbert, 1980; Schleuter & Schleuter, 1985), (d) tempo perception is significantly influenced by age and music training (Madsen, 1979; Miller & Eargle, 1990), and (e) tempo perception is also influenced by monotony, melody, rhythm, and even or uneven rhythm patterns (Bickel, 1984; Sink, 1983; Sink, 1984; Wang, 1984).

In 1987, Kuhn published a study that tested the effect of meter, tempo, and melodic activity (number of notes per beat) on the perception of tempo. Subjects ranged in age from second-grade through undergraduate students with a total of 175 subjects participating in the study. Three independent variables were investigated: tempo, meter, and melodic activity. Melodies were created in two meters, duple and triple. These melodies were assigned two tempi (slow = 92 and fast = 108 beats per minute). The melodies were each ornamented by maintaining the melodic outline and adding passing tones, upper and lower neighbor tones, and arpeggiated figures. In combination, these variables produced eight examples. Each example was paired with itself and each of the seven other examples. In each of the 36-paired test items, subjects were asked to indicate whether the second example in each test item was faster, slower, or the same tempo as the first item. Results of the

study indicated that subjects could readily perceive the tempo modulations as faster (108) or slower (92) when all other variables remained constant. Meter had no significant influence on tempo perception. Tempo perception, however, was significantly influenced by ornamented and plain versions of the two melodies.

Kuhn (1987) surmised that more sounds per beat gave the impression of greater speed. He suggested that further experimentation require a physical response from subjects designed to define the beat. Since subjects incorrectly identified ornamented versions of the melodies as being faster than plain versions, Kuhn postulated that melodic rhythm might require less cognitive abstraction than beat. If so, then melodic rhythm should be an easier concept and might best be taught before beat.

Another study (Duke, 1989) achieved similar results. Subjects were 300 students in grades 4, 5, and college undergraduates. Using extant musical examples as stimuli, Duke sought to assess the effect of melodic activity as a determinant in tempo perception. Four variations on a chaconne theme from Gustav Holst's First Suite in E-flat for Military Band, first movement, were arranged for four voices each employing a predominant rhythm of either quarter-note, eighth-note, triplet, or sixteenth-note in the upper voice.

Two different tempi were used, MM=100 and MM=112. This resulted in eight examples of the chaconne theme (four variations, each presented at two tempi), and a 36-item paired-comparison test format. These were fully counterbalanced and randomly ordered for presentation. To minimize fatigue among the elementary subjects, half of the fourth- and fifth-grade subjects completed 18 of the test items and the remaining half of the subjects completed the other 18 items. Subjects were asked to indicate whether the second example was faster, slower, or neither faster nor slower than the first example. Analyses revealed no significant difference in total correct responses between the fourth- and fifth-grade subjects; therefore all elementary responses were combined in subsequent analyses.

Results indicated that undergraduate subjects were significantly more accurate than elementary subjects in identifying tempo differences. Both groups achieved 88% accuracy on items in which each example was paired with itself (identical versions at identical tempi). When the melodic activity of a paired test item remained constant and the tempo of the second example changed, overall accuracy was 59%. Items that paired different melodic activity levels but maintained constant tempi had an overall accuracy of 28%. Interestingly, items that increased notes per beat

and tempo and vice versa produced 87% correct responses. By comparison, items that decreased notes per beat and increased tempo and vice versa produced a 27% correct response rate. These results are consistent with previous research and further indicate the influence of melodic activity on tempo perception.

Other research (Kuhn & Booth, 1988) adds more information to the understanding of tempo perception. This two-part study addressed the use of an added audible beat and a change in tempo designations. It was hypothesized that the addition of an audible beat would improve the subject's tempo perception and that wider tempo spans (MM=90, MM=102, and MM=118) would be more accurately identified by the subjects.

Subjects for the first part of the investigation were 46 third-graders and 49 sixth-graders in a suburban middle-class area. Their instruction for the two weeks before the testing included beat-tempo identification and defining terms including fast, slow, same, rhythm, and tempo. The test instrument was similar to that described in Kuhn's 1987 study: 36 test items with eight practice items, paired comparison technique, a plain (quarter note rhythm) three-measure melody, and an ornamented version of the same melody. Each example was presented with and without the

presence of an audible beat. Subjects were asked to listen to the two examples and indicate whether the second example was slower, faster, or no change from the first.

Test results clearly indicated that subjects perceived melodic activity as the crucial factor in tempo perception even though they had been taught otherwise. The question of the influence of audible beat was only partially answered. Subject responses may have been affected by the lack of counterbalancing. Audible beat seemed to be helpful when two variables changed, but results were not consistent across items or categories.

In the second part of Kuhn's 1987 study, audible beat was eliminated from the design. The focus for this study was on the degree of tempo change. Subjects were 47 fifth-graders from the same school as experiment 1. Independent variables were the same plain and ornamented melodies used in experiment 1 and three tempi designations MM=90, MM=102, and MM=118. Three tempi produced two sizes of tempo change: small (12 beats per minute), and large (28 beats per minute). Eight paired comparison, counterbalanced test items resulted. In addition, melodic activity changes agree with tempo changes in four test items and disagree in four test items. That is, when the tempo increased, notes

per beat increased in four items and when the tempo increased, notes per beat decreased in four items.

Results in this part of the study (Kuhn, 1987) were not as expected. The subjects had received instruction in tempo perception. The larger tempo spans were not effective in influencing the subjects' responses. The overriding influence on subjects' response choice was the level of melodic activity in the paired comparison. As the melodic activity increased, subjects identified the tempo as faster and as the melodic activity decreased, subjects identified the tempo as slower despite training designed to teach them to measure tempi by the steady beat, despite the presence of an audible beat, and despite an increase in the size of the tempo change.

Statement of the Problem

The apparent influence of melodic activity on tempo perception raised many questions. Is there a flaw in the teaching methodology? Are the concepts of tempo, steady beat, and rhythm being taught in the wrong order? Is a critical attribute of tempo being omitted? Is the elementary student capable of learning to measure tempo by steady beat? At what age can the student generally be expected to demonstrate understanding of these concepts?

Such questions led this investigator to embark upon a series of experiments.

The first issue to be addressed was whether the presence of a prominent steady-beat cue would influence tempo perception accuracy in the presence of melodic activity. A pilot study (Kendrick, 1991) was designed using Kuhn's (1987) plain and ornamented melodies in duple meter and his tempo designations of MM=92 and MM=108. The research tried to improve the accuracy of the subjects' tempo perception by including an audible-beat cue (a metronome giving an eight-beat preparation and continuing during each melody presentation), a motor response task (subjects were instructed to clap the beat with the metronome in preparation for, and during each melody presentation), and a visual model of the beat (the presenter clapped the beat with the metronome in preparation for, and during each melody presentation). Subjects were 25 second-graders at a rural middle-class elementary school who attended music class 22 minutes per day. With three types of beat cues (one aural, one visual, and one motor response task) to emphasize the steady beat, subjects continued to respond to the melodic activity when making tempo judgments, i.e., more notes per beat were judged to be faster. These results were consistent with previous research.

A second investigation (Kendrick, 1993) attempted to expand the population and examine the effect of specific instruction on the subjects' ability to accurately perceive tempo differences in the presence of melodic activity. Kuhn's (1987) design was used again, including his duple meter plain and ornamented melodies, tempo designations, and paired-comparison technique. These produced a 10-item measurement tool. The three-beat cues described in the previous study were retained. A pre- and posttest design was used. Control and treatment groups were randomly assigned to intact classes. Subjects were 35 fifth-grade students from a rural middle-class elementary school who received music instruction twice a week. Results of pretest indicated no significant difference between groups. Consistent with previous research, subjects responded to the melodic activity when making tempo judgments. The treatment group then received 2 weeks of instruction on tempo perception incorporating manipulatives to visualize beat-tempo relationships, and many opportunities to practice tempo discrimination. Both groups were posttested and comparison revealed no pre-post gain within the control group, but a significant pre-post gain within the treatment group. Thus specific instruction did appear to influence subjects' tempo perception.

A design flaw may have affected the results of this test. The metronome was used extensively during the treatment group's teaching segment. At posttest, the eight preparatory beats of each melody presentation may have influenced the treatment group to respond before they heard the melody. It is possible that the teaching segment only taught the subjects to attend to the metronome. If that is true, they could have chosen their responses upon hearing the eight preparatory metronome beats without hearing the melodies at all.

Purpose of the Study

The purpose of the present investigation was to modify and extend Kendrick's (1993) study using Kuhn's (1987) procedures. The study investigated the potential influence of using manipulatives to teach tempo perception in the presence of differing levels of melodic activity. The population was extended to another group of fifth-graders. The aural beat cue of the metronome was eliminated. The visual beat cue (the presenter clapping the beat), and the motor response task (clapping the beat with each melody presentation) were retained as were the control and treatment groups. Both the pretest and posttest therefore provided only two-beat cues for the subjects, the motor response task, and the visual beat cue.

Null Hypothesis

The following null hypotheses were investigated in this study:

1. There will be no significant difference between control and treatment group responses on posttest instrument.
2. There will be no significant difference among the three-test item responses (faster, slower, and same speed).

CHAPTER II

PROCEDURE

Subjects

Subjects for this study ($N=45$) were two fifth-grade classes from a suburban middle-class elementary school. Each class received music instruction once every third day for 45 minutes resulting in 135 minutes of instruction during each 2 week period. Intact classes were randomly assigned to the control and treatment groups and both classes were pre- and posttested.

Independent Variables

The two variables under consideration were tempo ($MM=92$ and $MM=108$) and melodic activity (plain and ornamented). The duple meter melody and tempo choices were taken from Kuhn's (1987) study. To represent the two variables, at two levels per variable, four examples were required. Each example was paired with itself and each of the other three examples. These pairings resulted in 16 items for the measurement instrument.

Ornamentation

Two versions of the melody were used for the measurement instrument. The plain version consisted of scale tones in a predominantly step-wise pattern

moving entirely in a rhythm that matched the beat, quarter-notes. The ornamented version maintained the plain melody and adds subdivided rhythms and nonharmonic tones including passing tones, upper and lower neighbor tones, and arpeggiated figures (Kuhn, 1987). Figure 1 shows the two versions of the melody with their two tempo designations. Melodies 1 and 3 were identical except for tempo (1. MM=92; 3. MM=108). The same relationship existed between melody 2 and melody 4.



Plain Melodies 1 (MM=92) and 3 (MM=108)



Ornamented Melodies 2 (MM=92) and 4 (MM=108)

Figure 1. Examples Used as Measurement Instrument Items

Stimulus Tape Preparation

An audiotape recording of the 16 measurement instrument items was prepared in random order for the pretest. The melodies were performed on a spinet piano. A Sony Radio Cassette-Corder CFS-W303 was used to record the test items. The 16 items were randomly reordered to control for a

learned order effect for the posttest.

Response Mode

Subjects were given a 16-item answer sheet. Each item listed the three possible answers: slower, faster, and same speed. The presenter modeled clapping the beat simultaneously with each item and continued clapping throughout each example. Subjects were asked to clap the beat softly with the presenter as they listened to each item. Subjects were then instructed to circle whether the tempo of the second example was slower, faster, or the same speed as the first example.

Treatment Group

The treatment group received three class periods (135 minutes) of specific instruction on the relationship between tempo, beat, and rhythm. Instruction included the use of classroom instruments, subdividing rhythms, metronome exploration, performing various tempo markings, and the use of manipulatives to visualize beat, rhythm, and tempo relationships.

The control group received regular class instruction from the basal music series Music and You (Staton & Staton, 1988). No specific mention was made of tempo, subdividing rhythms, metronome usage, or using manipulatives to visualize beat, rhythm, and tempo relationships.

CHAPTER III

RESULTS

This research was a two-sample, independent design using pretest and posttest. Data consisted of the number of correct responses per subject to the 16 items tested. Resulting ordinal data was analyzed using non-parametric statistics. Comparison of the treatment and control groups at pretest using the Mann Whitney U statistic revealed no significant difference ($Z [1,45] = .249, p < .4013$). Therefore, both groups were statistically equivalent at pretest and all subjects' responses were combined in subsequent analysis.

Comparison of the treatment and control groups at posttest using the Mann Whitney U statistic approached significance ($Z [1,45] = 1.60, p < .0548$). To further examine possible differences pre to post, the Wilcoxon Matched Pairs statistic (Madsen & Moore, 1974) was used to measure pre-post gain within groups. Data consisted of each subject's correct responses at pretest paired with their correct responses at posttest. This revealed no significant pre-post gain within the control group ($T [1,22] = 87.5, p > .05$), and a pre-post gain within the treatment group approaching significance ($T [1,23] = 77.0, p < .0527$).

Therefore while the control group showed no significant gain at posttest, the treatment group achieved a posttest gain very near significance.

Chi-Square analysis (see Appendix A for statistics) was computed on each of the 16 items. Data consisted of the number of responses to each of the three response choices: slower, faster, and same speed. The Chi-Square statistic was used to determine if subjects deliberately chose a response or if their responses were random. All pretest items were significant, $p < .05$. This indicated that subjects clearly favored one of the three response choices. All control group posttest items were also significant, $p < .05$. Therefore all control group subjects deliberately chose one of the responses. Fourteen of the treatment group posttest items were significant, $p < .05$. This indicates that they deliberately chose one of the responses on those 14 posttest items. The ornamented-fast and plain-fast posttest item had an even response distribution ($\chi^2[2,23]=5.12$, $p > .05$). The ornamented-slow and plain-fast posttest item also had an even distribution ($\chi^2[2,23]=4.00$, $p > .05$). This indicates that subjects' responses were random on these two posttest items.

Measurement instrument items were then grouped into tables according to the majority of subjects correctly and incorrectly responding to the 16 items. This process allowed the isolation and comparison of items that were perceived correctly and/or incorrectly by the majority of subjects in each group. See Table 1 for a comparison of control and treatment groups' correct pretest and posttest scores.

Table 1

Items Correctly Perceived by a Majority of Subjects

Direction of change from Ex. 1 to Ex. 2			Subjects' Pretest Responses									Subjects' Posttest Responses					
			Condition		Control Group			Treatment Group			Control Group			Treatment Group			
					(n=22)			(n=23)			(n=22)			(n=23)			
Note	Tempo	Ex.1	Ex.2	Slower	Faster	Same	Slower	Faster	Same	Slower	Faster	Same	Slower	Faster	Same		
1.	0	0	PF	PF	2	2	18	3	4	16	0	1	21	0	1	22	
2.	0	0	PS	PS	0	0	22	0	1	22	4	0	18	2	0	21	
3.	0	0	OS	OS	1	2	19	1	0	22	0	4	18	1	2	20	
4.	0	0	OF	OF	0	0	22	0	2	21	0	4	18	1	2	20	
5.	0	-	OF	OS	21	0	1	22	1	0	19	1	2	13	2	8	
6.	0	+	OS	OF	0	22	0	1	22	0	0	20	2	0	22	1	
7.	0	+	PS	PF	2	20	0	0	23	0	1	21	0	3	16	4	
8.	0	-	PF	PS	22	0	0	23	0	0	21	0	1	20	0	2	
9.	-	-	OF	PS	22	0	0	23	0	0	22	0	0	21	0	2	
10.	+	+	PS	OF	0	20	2	1	21	1	0	21	1	0	21	2	
11.	-	+	OS	PF	3	19	0	5	17	1	5	15	1	7	12	4	
12.	-	0	OS	PS	(INCORRECT)			(INCORRECT)			(INCORRECT)			11	0	12	
13.	+	0	PS	OF	(INCORRECT)			(INCORRECT)			(INCORRECT)			(INCORRECT)			
14.	-	0	OF	PF	(INCORRECT)			(INCORRECT)			(INCORRECT)			8	3	12	
15.	+	0	PS	OS	(INCORRECT)			(INCORRECT)			(INCORRECT)			0	9	14	
16.	+	-	PF	OS	(INCORRECT)			(INCORRECT)			12	8	2	16	5	2	

Underlining indicates a correct response

0 No change P Plain melody
 + Increase O Ornaented melody
 - Decrease S Slow tempo (MM=92)
 F Fast tempo (MM=108)

It is clear from the number of items answered correctly at pre- and posttest that subjects in both groups were able to identify identical melodic examples presented at identical tempi (items 1 through 4), identical melodic examples presented at different tempi (items 5 through 8), and examples in which the direction of change was in agreement; tempo increase paired with notes per beat increase and tempo decrease paired with notes per beat decrease (items 9 and 10). Item 11 was also correctly identified by the majority of subjects. This was unexpected since the direction of change was in disagreement; tempo increase paired with notes per beat decrease. There was no apparent explanation for the one anomaly in the data.

At posttest both the control and treatment groups continued to correctly respond to items 1 through 11. The control group improved correct responses on one of the previously incorrect five items involving a change in melodic activity (item 16). The treatment group improved correct responses on four of the same items (items 12, 14, 15, and 16).

See Table 2 for a comparison of control and treatment groups' incorrect pretest and posttest scores.

Table 2

Items Incorrectly Perceived by a Majority of Subjects

Direction of change from Ex. 1 to Ex. 2		Condition		Subjects' Pretest Responses						Subjects' Posttest Responses					
				Control Group			Treatment Group			Control Group			Treatment Group		
				(n=22)			(n=23)			(n=22)			(n=23)		
Note	Tempo	Ex. 1	Ex. 2	Slower	Faster	Same	Slower	Faster	Same	Slower	Faster	Same	Slower	Faster	Same
12. -	0	OS	PS	19	0	<u>3</u>	21	0	<u>2</u>	19	0	<u>3</u>	(CORRECT)		
13. +	0	PS	OF	0	18	<u>4</u>	0	21	<u>2</u>	0	20	<u>2</u>	0	17	<u>6</u>
14. -	0	OF	PF	16	0	<u>6</u>	15	0	<u>8</u>	16	1	<u>5</u>	(CORRECT)		
15. +	0	PS	OS	0	22	<u>0</u>	1	15	<u>7</u>	1	17	<u>4</u>	(CORRECT)		
16. +	-	PF	OS	<u>8</u>	9	<u>5</u>	<u>6</u>	14	<u>3</u>	(CORRECT)			(CORRECT)		

Underlining indicates a correct response

0 No change P Plain melody
 + Increase O Ornamented melody
 - Decrease S Slow tempo (MM=92)
 F Fast tempo (MM=108)

Table 2 clearly indicates that every item perceived incorrectly involved a change in melodic activity; plain melody paired with ornamented melody or ornamented melody paired with plain melody. These results are consistent with previous research and further indicate the influence of melodic activity on tempo perception. At posttest the control group improved correct responses on one of the five items involving a change in melodic activity while the treatment group improved on four of the five items.

CHAPTER IV

DISCUSSION

It is evident that melodic activity (the number of notes per beat) has more influence on children's perception of tempo than does steady beat. These results are consistent with previous research. While the current investigation did not achieve significance, results from this study indicate that tempo perception may be influenced with some degree of success when students are actively involved in performing beat, tempo, and melodic rhythm. Manipulation of visual, aural, and tactile stimuli allow the students to interact with and experience these abstract musical concepts on a more concrete level. Such experiences did appear to have a positive influence on subjects' tempo perception.

Several aspects of the design are important for consideration in future research. First, the sample size was rather small ($n=22$, and $n=23$). Such small numbers can affect statistical results. If possible, each group should contain at least 30 subjects to insure the accuracy of statistical results. Second, the treatment period was quite short. Three class periods of instruction required that the bulk of class time be devoted to tempo perception issues.

It is possible that a longer treatment period of perhaps 4 to 6 weeks with a shorter segment of tempo instruction each class period would be more effective. Third, the research project was conducted during the month of May. The optimum time for children to be highly motivated to learn, and to achieve maximum concentration is probably not during the last 2 or 3 weeks of school. Future studies would likely benefit from earlier scheduling in the school year.

More research is needed to determine the influences on tempo perception, the most appropriate ways to teach the concept of tempo, and the optimum age at which to introduce the concept. Another study designed to incorporate an audible beat cue would be informative. Other teaching methods using language as a basis to differentiate between steady beat and melodic rhythm might be effective. Students proficient at beat performance should be identified and tested to determine if beat perception is a prerequisite to tempo perception. Perhaps movement and the resulting internal sense of pulse is the key to discriminating between steady beat and melodic activity as the measure of tempo. Older populations should be studied to determine at what age students can be expected to demonstrate understanding of these concepts.

Whatever future research contributes to the understanding of these and other issues can only improve the teaching profession and the end product of that profession, the student musician.

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APPENDICES

APPENDIX A
Chi-Square Statistics

CHI-SQUARE STATISTICS

Pretest Chi-Square Statistics

- | | |
|------------------------------------|-------------------------------------|
| 1. ($\chi^2[2,45]=36.13, p>.05$) | 9. ($\chi^2[2,45]=90.00, p>.05$) |
| 2. ($\chi^2[2,45]=84.13, p>.05$) | 10. ($\chi^2[2,45]=67.73, p>.05$) |
| 3. ($\chi^2[2,45]=67.60, p>.05$) | 11. ($\chi^2[2,45]=32.73, p>.05$) |
| 4. ($\chi^2[2,45]=78.53, p>.05$) | 12. ($\chi^2[2,45]=63.33, p>.05$) |
| 5. ($\chi^2[2,45]=78.53, p>.05$) | 13. ($\chi^2[2,45]=67.73, p>.05$) |
| 6. ($\chi^2[2,45]=84.13, p>.05$) | 14. ($\chi^2[2,45]=32.13, p>.05$) |
| 7. ($\chi^2[2,45]=78.53, p>.05$) | 15. ($\chi^2[2,45]=49.60, p>.05$) |
| 8. ($\chi^2[2,45]=90.00, p>.05$) | 16. ($\chi^2[2,45]=7.60, p>.05$) |

Posttest Chi-Square Statistics

Control Group	Treatment Group
1. ($\chi^2[2,22]=35.25, p>.05$)	1. ($\chi^2[2,23]=38.62, p>.05$)
2. ($\chi^2[2,22]=22.50, p>.05$)	2. ($\chi^2[2,23]=33.62, p>.05$)
3. ($\chi^2[2,22]=22.50, p>.05$)	3. ($\chi^2[2,23]=27.37, p>.05$)
4. ($\chi^2[2,22]=22.50, p>.05$)	4. ($\chi^2[2,23]=22.50, p>.05$)
5. ($\chi^2[2,22]=25.75, p>.05$)	5. ($\chi^2[2,23]=7.62, p>.05$)
6. ($\chi^2[2,22]=30.50, p>.05$)	6. ($\chi^2[2,23]=38.62, p>.05$)
7. ($\chi^2[2,22]=35.25, p>.05$)	7. ($\chi^2[2,23]=13.12, p>.05$)
8. ($\chi^2[2,22]=35.25, p>.05$)	8. ($\chi^2[2,23]=30.50, p>.05$)
9. ($\chi^2[2,22]=40.50, p>.05$)	9. ($\chi^2[2,23]=31.75, p>.05$)
10. ($\chi^2[2,22]=35.25, p>.05$)	10. ($\chi^2[2,23]=33.62, p>.05$)
11. ($\chi^2[2,22]=11.75, p>.05$)	11. ($\chi^2[2,23]=4.00, p<.05$)
12. ($\chi^2[2,22]=26.25, p>.05$)	12. ($\chi^2[2,23]=11.12, p>.05$)
13. ($\chi^2[2,22]=35.25, p>.05$)	13. ($\chi^2[2,23]=33.62, p>.05$)
14. ($\chi^2[2,22]=15.25, p>.05$)	14. ($\chi^2[2,23]=5.12, p<.05$)
15. ($\chi^2[2,22]=18.25, p>.05$)	15. ($\chi^2[2,23]=12.62, p>.05$)
16. ($\chi^2[2,22]=6.50, p>.05$)	16. ($\chi^2[2,23]=13.62, p>.05$)

APPENDIX B
Sample Answer Sheet

SAMPLE ANSWER SHEET

Name _____
Teacher _____

WHAT DO YOU THINK?

Directions: For each number you will hear 2 melodies. Clap the beat softly with Mrs. Kendrick as you listen to each melody. Then circle whether you thought the second melody was slower, faster, or the same speed as the first melody.

- | | | | |
|-----|--------|--------|------------|
| 1. | slower | faster | same speed |
| 2. | slower | faster | same speed |
| 3. | slower | faster | same speed |
| 4. | slower | faster | same speed |
| 5. | slower | faster | same speed |
| 6. | slower | faster | same speed |
| 7. | slower | faster | same speed |
| 8. | slower | faster | same speed |
| 9. | slower | faster | same speed |
| 10. | slower | faster | same speed |
| 11. | slower | faster | same speed |
| 12. | slower | faster | same speed |
| 13. | slower | faster | same speed |
| 14. | slower | faster | same speed |
| 15. | slower | faster | same speed |
| 16. | slower | faster | same speed |

APPENDIX C
Lesson Plans

DAY 1 LESSON PLAN

Opening

1. Circle-up, sing Song-of-the-Month, "This Land Is Your Land," and review form (AA).
2. March around the circle to steady beat of music changing direction for second A section.
3. March around at new tempo; students identify what changed.
4. March and sing at another tempo; students identify change.

Lesson

1. Introduce metronome allowing for exploration.
2. Introduce terms: MM=, adagio, presto, largo, and andante.
3. Pass out manipulatives: four cards marked MM=92 (the same size as the erasers), four erasers marked as quarter notes, eight tennis balls marked as eighth notes, and sixteen cotton balls marked as sixteenth notes.
4. Invite students with MM=92 cards to place them on display.

5. Choose beat-keeper to set and operate metronome. Class listens to and patschens the beat of the metronome. Discuss steady beat.
6. Add erasers on top of cards. Class listens to beat and claps quarter notes. Compare steady beat and one-sound-per-beat rhythm.
7. Remove erasers; replace with tennis balls. Class listens to beat and claps eighth notes. Discuss what happened. Divide into 2 groups; one group claps the eighth note rhythm while the other patschens the beat.
8. Repeat the process with the cotton balls.
9. How do we measure tempo? Discuss.
10. If time remains, sing songs at different tempi allowing a beat-keeper to set the metronome and conduct the song.

Closure

Review terms. Correct answers earn the right to choose 2 friends and travel to the door at a particular tempo set on the metronome by the teacher.

Materials

"This Land Is Your Land" music, metronomes, four cards marked MM=92 (size of erasers), four erasers marked as quarter notes, eight tennis balls marked as eighth notes, and 16 cotton balls marked as sixteenth notes.

DAY 2 LESSON PLAN

Opening

1. Walk at adagio tempo to the circle formation.
2. Choose a beat-keeper to set an appropriate MM on the metronome for, "This Land Is Your Land". March around the circle to the beat changing direction to show the form as in Lesson 1.
3. March again putting the beat in the feet and the rhythm in the hands. Discuss.

Lesson

1. Walk at largo tempo to assigned seats.
2. Review lesson 1 terms and concepts, repeating procedures as necessary.
3. Discuss following question: If changing rhythms does not change tempo, what does?
4. Using procedures from lesson 1, introduce the MM=108 cards (identical in size but different in color from MM=92 cards) and compare and contrast the MM=92 rhythms with the MM=108 rhythms using the manipulatives. Discuss what happens.
5. Play the Beat Keeper Game. Choose a partner. One partner will perform the beat on the drum while the other performs the rhythm on an instrument of choice.

Partners draw for beat designation and rhythm (see materials list). Perform for class. Choose some other partnership to tell rhythm and MM performed. After second performance teacher asks if second performance was slower, faster, or same speed as previous performance. Discuss.

6. If time remains, sing songs at different tempi as in Lesson 1.

Closure

On a sheet of paper write the following: What decides the tempo? Beat or Rhythm. Give each partnership the piece of paper in turn, asking them to read the question and point to the correct answer. Correct answers earn the right to move to the door at a particular tempo as in Lesson 1.

Materials

"This Land Is Your Land" music, manipulatives from Lesson 1, four cards of a different color marked MM=108 (the size of the erasers), metronomes, one envelope marked steady beat and containing two slips marked MM=92 and MM=108, one envelope marked rhythm and containing three slips marked as two measures of quarter notes, two measures of eighth notes, two measures of sixteenth notes, and a sheet of paper with closure question and answer choices.

DAY 3 LESSON PLAN

Opening

1. Walk at presto tempo to circle-up.
2. Class chooses two movements or directions to perform to "This Land Is Your Land". An example could be in first A section slide right and in second A section slide left.
3. Discuss what determined the tempo.

Lesson

1. Walk at andante tempo to assigned seats.
2. Assigned students get chromatic bell set for partnership.
3. Teach "Hot Cross Buns" singing, using solfege, and notating on the board using the melodic contour only in all quarter notes on the pitches C, D, and E.
4. Allow partnerships time to practice playing the song on the bells.
5. Notate a second time in eighth notes allowing practice on the bells.
6. Notate a third time in sixteenth notes allowing practice on the bells.
7. Did tempo change? Discuss.

8. Play Keep the Beat using notated songs from the board. Use envelopes from Lesson 2 to draw for tempo and rhythm. Partnerships draw from the two envelopes, set metronome, and perform. Class members may play along using index fingers rather than mallets for practice.

9. If time remains improvise two short melody examples that illustrate the concepts and ask the class to listen and determine if the second example is faster, slower, or the same speed as the first example.

Closure

Name two tempi and have student tell which is faster. Correct answer earns the right to move to the door at that tempo to line-up.

Materials

"This Land Is Your Land" music, manipulatives from Lessons 1 and 2, two envelopes from Lesson 2, chromatic bell sets, and metronomes.