

Frameworks Data Report

In this project two different tests were administered to the same group of twenty fourth-graders. The cognitive test addressed the student's ability to read and understand musical notation in a written format and the psychomotor test addressed the student's ability read music and perform it on recorder.

Descriptive Analyses

The cognitive test had a possible score of 15 and the psychomotor test had a possible score of 48. In the results of central tendency, the mean for the cognitive test was 8.1 and the median was 7.0, meaning that 50% of the students measured at or above 7 and 50% measured at or below 7. The results were bimodal; the most frequently occurring scores were 5 and 6. The psychomotor test had a mean of 34.35 and a median of 33.5. The results included multiple modes at scores of 24, 31, and 41. The range of the psychomotor test scores was from 18 (the lowest) to 47 (highest). The range of the cognitive test scores was from 4 (lowest) to 14 (highest). Neither test produced a perfect score in the twenty students or any scores of 0. The standard deviation for the cognitive test scores was 3.13 and it was 7.93 for the psychomotor test scores.

The distribution of the cognitive test had a moderately positive skew of 0.52 and the distribution of the psychomotor test had a small negative skew of -0.22. Possible explanations for the scores being generally bunched together in lower scores for the cognitive test include difficulties in reading and understanding directions and the unfamiliarity of taken a written test in music class. Most of the students' experiences in

music are participatory and often done as a class. Possible explanations for the negative skew of the psychomotor test scores include the recent focus of the students' music lessons on recorder, students' ability to memorize songs rather than read the music (they were tested on a song they have been playing in class), and also the nature of some of the test items. Items on posture and holding the instrument were weighted similarly to rhythm and pitch accuracy so even if a student could not play any of the pitches or rhythms, almost all of the students had no difficulty in holding the instrument properly or standing with good posture.

The kurtosis of the cognitive test was -1.17. In looking at the histogram, it is obvious that it is bimodal and that the lower peak is twice as high. Some of the same factors previously mentioned may have contributed to this shape but there is also the possibility that it overwhelmed some students. Nine, almost half, of the twenty students did not attempt to answer one or more of the last six items of the cognitive test. It is possible that the smaller peak of higher scores is due to students that either tend to be high-achievers and retain information well or engage in extracurricular music activities or lessons, or a combination of those two factors. The kurtosis of the psychomotor test was -0.66 and almost presented a normal bell curve. To a lesser extent than the cognitive test, two peaks are present in the histogram (they are not as far apart from each other). The higher peak is lower but, again, probably represents the group of higher achieving students who are possibly involved in extracurricular musical activities.

Internal Consistency

Applying the Kuder-Richardson 20 formula to the cognitive measure resulted in a reliability coefficient of 0.92, which can be considered an excellent indication of internal

consistency. Item difficulty and discrimination was also calculated for the cognitive test scores. The discrimination was calculated using the top and bottom third of test scorers. The least difficult item proved to have no discrimination (0.0) as 100% of the students answered the item correctly. The most difficult item was item #13, which only 15% of the students answered correctly. This is interesting because nine of the twenty students left one or more questions unanswered or wrote in, "I don't know," but the question that was most frequently left unanswered was the next question, item #14. Seven students did not attempt item #14 while only two students did not attempt #13. Item #13 asked the students to find the first note of a specific measure (it was a dotted quarter note) and write how many beats that note lasted. The least difficult item, #6, was a fill-in-the-blank item that read, "The top number (2) in the time signature 2/4 means there are 2 _ per measure." Based on 100% correct response, this is probably a concept that the students have been learning and reviewing for multiple grade levels and could be either omitted or revised to be more difficult. Test item discrimination was not consistent. Three of the items (items #12, 14, and 15) showed fairly good discrimination (0.71) and six of the items (#1, 4, 5, 7, 10, and 11) scored just above 50% discrimination (0.57). Item #2 scored just under 50% discrimination (0.43), item 13 scored at 29% discrimination and three items (#3, 8, and 9) scored at only 14% discrimination. As mentioned above, one item (#6) scored 0% discrimination, indicating no ability whatsoever to discriminate between test subjects.

Given the reliability calculated using Cronbach's alpha and the Spearman-Brown Prophecy Formula (0.82 and 0.87, respectively), the internal consistency of the psychomotor test had good reliability. If the test were revised to align with specific

instruction and weight any desired areas of focus, it has potential to be a good measure of students' individual progress in their ability to read music and perform on the recorder.

Correlation Between Cognitive and Psychomotor Scores

The relationship between the cognitive and psychomotor measures was examined by calculating the correlation using Spearman's rho ($r = 0.46$) and the Pearson ($r = 0.55$) correlation coefficients, displaying a substantial amount of variance explained ($r^2 = 0.22$ for Spearman's rho and $r^2 = 0.30$ for Pearson). Both coefficients showed a moderately positive relationship. In general, students who did well on one of the measures tended to do well on the other measure and those who did poorly on one measure tended to do poorly on the other measure. Looking at the scatterplot of the correlation between the two measures, it is interesting to note that those students who measured the lowest on the cognitive measure scored in the mid and just above the mid range of the psychomotor measure. The student who measured the very lowest on the cognitive measure placed in the top third of the scores from the psychomotor measure. There are many factors that could explain this trend. It is possible that these students have strong aural abilities or stronger application abilities than they do reading abilities. It is also possible that these students prefer performance to written work or struggle with staying focused on written work. However, not enough data was gathered to positively confirm any of these speculations.