

Musicality Profile of Hong Kong Children

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Abstract— Musicality is a quality possessed by someone often depicted with a sensitivity to, knowledge of, or talent for music. One prevalent contention related to musicality is the issue of nature versus nurture. Like most other forms of human competence, musicality may be viewed as a combined product of innate potential developed and nurtured through a learning process. Hence, musicality may be seen as a coalition of music aptitude and music achievement. Musical aptitude tests were conducted on 3490 Hong Kong students. Music achievement data were subsequently obtained from 2356 subjects. Analysis of Variance (ANOVA) was performed to investigate the effects of age and gender on both Music Aptitude and Music Achievement scores. The present investigation provided quantitative data as evidence for a framework to view diversity in student aptitude and achievement in light of their independent learning capabilities and musical potentials.

Keywords-music aptitude; music achievement; children; testing

I. INTRODUCTION

Like common aptitude tests, assessment of musical aptitude would provide an indication of a student's potential to achieve in music. It is therefore a predictive measurement. Current tests and exams on music are often achievement test, designed to assess a student's performance and mastery of techniques and skills. The most common form of musical exam found in schools is typically an evaluation of skills acquired by students at the end of a school term. Public music exams most often measure a student's performance techniques or understanding of musical theory and concepts. Because many students with high music aptitude have not had the opportunity to achieve in music, a music aptitude test can reveal musical potential that might otherwise remain unknown to those students and their teachers. Therefore, musical aptitude testing does not aim to identify students for inclusion or exclusion in music activities because all students have the right to a comprehensive musical education. Music aptitude testing helps music teachers meet the unique needs of each student.

II. PURPOSE OF STUDY

The purpose of the present study was to systematically assess the musical aptitudes of students in Hong Kong. Data were also collected on the musical achievement of students for further analyses. Thus, the objectives of the present study were:

- To collect data on musical aptitude using Intermediate Measures of Music Audiation (IMMA) by Gordon, E.

(1982) and Advanced Measures of Music Audiation (AMMA) by Gordon, E. (1989);

- To obtain musical achievement data, which include both school music grades and profile of private musical instruction and related performance experience.

III. METHODOLOGY

The sample of students aged nine to fourteen was recruited from eleven schools in Hong Kong. Both Tonal and Rhythm subtests of the Intermediate Measures of Music Audiation (IMMA) were administered to a total of 3490 students. IMMA was developed in to measure the developmental tonal and rhythm aptitudes of children. It includes an answer sheet with pictures so that literacy skills are not required. The test consists of 80 pairs of musical stimuli, 40 tonal and 40 rhythm patterns. Electronic sounds generated by a synthesizer are used as stimuli. The task for the student is to determine whether the paired patterns are same or different. The administration time is at most two twenty-minute periods. Questions on the compact disks are identified on the answer sheet by pictures, not numbers or words. The children must decide on whether pairs of tonal or rhythm patterns they hear sound the same or different. They indicate their choice by simply drawing a circle around the picture on the answer sheet. Subsequent studies have produced evidence that musical aptitude is unstable during the primary years, that IMMA scores predict achievements in young children, that developmental aptitude as measure by IMMA is sensitive to instruction, particularly in cases where the level of aptitude is low. The IMMA have been examined with different populations and differing conditions and was found to have acceptable reliability with English children (Holahan & Thompson, 1981).

Three sets of test scores were derived from the IMMA: Tonal, Rhythm, Composite. Raw scores for each subtest were calculated and subsequently translated into percentile rank to the corresponding age of the subject. Standardization of both IMMA and AMMA were based on US subjects. Music Achievement data were collected from eight schools and 2356 participants included grades and marks. Assessment methods were diverse, including items such as Singing, Recorder, Music Project, Written Examination, Class Performance, which carry different weighting. Nevertheless, those differences were recorded and could be helpful in interpretation of data.

Conversion of scores (Levels 1-4):

- 1 = D or below 60
- 2 = C or 60-69
- 3 = B or 70-84;
- 4 = A or 85-100

IV. RESULTS

A. Results of Musical Aptitudes

A set of six scores were yield from the two tests: 1) Raw Tonal Scores (RTS); 2) Tonal Percentile Rank (TPR); 3) Raw Rhythm Scores; 4) Rhythm Percentile Rank (RPR); 5) Composite Raw Score (CRS); and, Composite Percentile Rank (CPR). Since the present investigation was the first in using Hong Kong children, percentile rank from the standard sample from the United States was used as a benchmark. For Age 9 students (n=456), Means for Tonal Aptitude is 64.28 (SD=3.76); Means for Rhythm Aptitude is 45.77 (SD=3.41); Means for Composite Music Aptitude is 49.52 (SD=6.7). For Age 11 students (n=432), Means for Tonal Aptitude is 63.28 (SD=3.21); Means for Rhythm Aptitude is 42.97 (SD=3.89); Means for Composite Music Aptitude is 49.66 (SD=6.39). For Age 12 students (n=469), Means for Tonal Aptitude is 58.23 (SD=3.09); Means for Rhythm Aptitude is 52.31 (SD=3.25); Means for Composite Music Aptitude is 55.52 (SD=5.7). For Age 14 students (n=440), Means for Tonal Aptitude is 60.98 (SD=3.16); Means for Rhythm Aptitude is 55.77 (SD=3.67); Means for Composite Music Aptitude is 58.12 (SD=5.27).

Reliabilities of levels were high for all scores, ranging from .85 to .92 and a standard error of a difference of 1.9 to 2.5. Intercorrelations among IMMA range from .38 to .48, suggesting that the greatest portions of variances of the Tonal and Rhythm subtests are related to factors, which the two tests do not have in common. However, the younger the students, the wider the differences between his or her Tonal and Rhythm subtest scores. This might be explained by the phenomenon described as a developmental music aptitude in the younger students, whereas older students demonstrated a stabilized music aptitude.

To compare and differences in gender and age, Analysis of Variance (ANOVA) were calculated. Results are reported in Table 3. For Tonal Aptitude, both Gender and Age show a statistical significance. For Rhythm Aptitude, only Gender shows a statistical significance. For Composite Aptitudes, Gender also shows a statistical significance.

To identify whether there are inherent differences between subgroups, t-tests were used to test whether socioeconomic status, gender, and age on music aptitude. Statistical significant difference was found in age x composite music aptitude ($p = .031$) where older age students had lower aptitude scores. The findings support the concept of stabilized music aptitude whereby training at a later age (after age 9) has minimal effects on music aptitude scores. Another statistical significance was found between Tonal and Rhythm Aptitude across all age levels and gender subgroups. Hong Kong students' Tonal aptitude was significantly higher than that of

their Rhythm Aptitude ($p = .021$ to $.039$). Differences between all other variables were statistically insignificant.

TABLE I. ANALYSIS OF VARIANCE FOR TONAL, RHYTHM AND COMPOSITE APTITUDE

Variables	df	Tonal		Rhythm		Composite Aptitude	
		F	p	F	p	F	p
Gender	1	9.165	.005*	37.423	.000*	26.825	.000*
Age	1	4.812	.031*	.923	.671	3.625	.094
Gender X Age	1	.233	.037	.041	.895	.301	.825

* $p < 0.05$

B. Results of Musical Achievement

TABLE II. MUSICAL ACHIEVEMENT DISTRIBUTED BY AGE AND GENDER GROUPS

Ranks	Girls	Boys	Sum
4	390	270	n = 660
3	560	450	n = 1010
2	232	292	n = 524
1	71	91	n = 162
Sum	n = 1253	n = 1103	

Above is a cross tabulation of Music Achievement Rank by Gender.

C. Music Aptitude and Music Achievement

To compare and differences in gender and age, Analysis of Variance (ANOVA) were calculated. Results are reported in Table 3. For Tonal Aptitude, both Gender and Age show a statistical significance. For Rhythm Aptitude, only Gender shows a statistical significance. For Music Aptitudes, Gender also shows a statistical significance. A moderate difference was found between students who received more than 5 years of formal music training in addition to general classroom music instruction. Such differences are probably a result of the extent of exposure of each group to an enriched musical environment. Analyses of correlations between music aptitude scores and school music achievement scores provided further support, with reliability coefficient range from .65 in the younger students to .89 in the older students. Results suggest that IMMA and AMMA could provide diagnoses and prediction for future achievement in music.

V. DISCUSSIONS

Although Hong Kong children's composite musical aptitude were comparable to the standardized norm established with North American children, Hong Kong children possessed significantly higher "tonal aptitudes" than North Americans

whereas Hong Kong boys performed better in the “Rhythm” subtest.

Present findings and literature on neuroplasticity provide supportive evidence for positive correlations between formal music training and selected cognitive performance. Results suggest that investment on long-term music training impact on academic readiness (i.e., attention and processing speed), whereas short-term effects might not be initially evidential in younger students.

The present investigation shed new understandings concerning aptitude and achievement in music:

- Music education in younger children should focus on cultivating developmental aptitude. Hence, more resources and systematic reforms could be devoted to lower primary students.
- Music training may be viewed as crucial investment in well-rounded education that cultivates cognitive development.
- Music achievement should be viewed as a product of music aptitude and music training, rather than a mere product of special talent possessed by selected minority within the population. Hence, given realistic expectations and appropriate teaching strategies, all students could achieve in music.

Findings point to plausible language differences in pitch processing and effects of school curriculum and learning environment among kindergartens in North America and Hong Kong. It also implies a strong need to develop a set of standardized music test relevant for Asian children.

Findings from the present study support the notion that music aptitude is normally distributed; there is no one without some degree of music aptitude. Music aptitude is not correlated with race, religion, nationality, or social status; and highly intelligent persons are not necessarily highly musical nor are highly musical persons necessarily intelligent.

Results from Hong Kong students also support the concept of “developmental music aptitude”. From the time a child is

born if not before birth, until he is approximately nine years old, his music aptitude is a product of both nature and nurture. He is born with a certain level of music aptitude, which may rise or fall, depending upon the equality of his music environment. The younger he is, the greater the effect his environment will have on his music aptitude. Because a child's level of music aptitude is subject to change, depending upon his musical surroundings, until he is nine years old, his music aptitude during that time is defined as developmental.

After a child is nine years old, his music aptitude becomes stabilized. His musical environment will no longer have any effect on his level of music aptitude. That is not to say that a child cannot achieve in music after he is nine years old. What it means is that a child who is older than nine will not be able to achieve in music any higher than his level of stabilized music aptitude will allow. It follows that a child's early exposure to music may well be the most important determining factor of the extent to which he will be able to create musically when he is older.

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