CHAPTER SIX: THE RESULTS

6.1. The Introduction

This chapter reports on the results of the study which set out to show the effectiveness of LCK MusET in helping subjects to develop AP, to find determining factors, and to better understand the characteristics and value of AP. Both quantitative and qualitative data were examined.

There were five sources of gathering data, namely: the "Answer Sheet of AP Assessment for New Students", the "Student Background Information Sheet before Entering MusH", the "Answer Sheet of AP Assessment", the "Comment of Student's Response on AP Assessment" and the "Questionnaire of Student's Background on Developing AP".

There were four groups of subjects who were analyzed according to their different levels of AP achievement. They were the whole 144 AP0-AP10, 122 (84.72%) AP1-10, 58 (40.28%) AP1-AP4 and 64 (44.44%) AP5-10 subject groups.

6.2. Pretest Results

No subject scored any marks in the pretest, since those with AP were excluded from the sample.

6.3. Post-test Results

The post-test scores were presented in two ways, i.e. the scores ignoring octave errors (see Table 6.3.1) and those with octave errors counted (see Table 6.3.2).

Table 6.3.1: Score Ignoring Octave Errors

Pass or Fail	Score (%)	Number of Subjects	Percent	Cumulative Number of Pass & Fail	Cumulative Percent of Pass & Fail	Percent
Fail	0-9	19	13.2	19	13.2	13.2
Initial (Fail)	10-19	11	7.6	30	20.8	20.8
	20-29	11	7.7	41	28.5	28.5
	30-39	16	11.1	57	39.6	39.6
	40-49	14	9.8	71	49.3	49.3
	50-59	7	4.9	78	54.2	54.2
Satisfactory (Pass)	60-69	20	13.9	20	13.9	68.1
	70-79	13	9.0	33	22.9	77.1
	80-89	22	15.3	55	38.2	92.4
	90-99	10	6.9	65	45.1	99.3
	100	1	0.7	66	45.8	100.0
Total		144	100.0	144	100.0	100.0

Table 6.3.2: Score with Octave Errors Counted

Pass or Fail	AP Grading	Scores (%)	Number of Subjects	Percent	Cumulative Number of Pass & Fail	Cumulative Percent of Pass & Fail	Cumulative Percent
Fail	AP0	0- 9	22	15.3	22	15.3	15.3
Initial (Fail)	AP1	10-19	15	10.4	37	25.7	25.7
	AP2	20-29	19	13.2	56	38.9	38.9
	AP3	30-39	12	8.3	67	47.2	47.2
	AP4	40-49	12	8.3	80	55.6	55.6
Satis-factory (Pass)	AP5	50-59	21	13.8	21	13.8	69.4
	AP6	60-69	12	8.3	33	22.1	77.8
	AP7	70-79	18	12.5	50	34.6	90.3
	AP8	80-89	8	5.6	58	40.2	95.8
	AP9	90-99	5	3.5	63	43.7	99.3
	AP10	100	1	0.7	64	44.4	100.0
Total			144	100.0	144	100.0	100.0

In the marking scheme with scores ignoring octave errors, 78 subjects (54.2%) failed in the post-test, including four subjects (2.8%) with zero mark. Sixty-six subjects (45.8%) passed, including one (0.7%) with full marks. See Table 6.3.1.

In the marking scheme of the answer with the right note name and octave error as half right, 22 subjects (15.3%) had AP0 (0%-9%), including four (2.8%) with zero mark. Fifty-eight (40.2%) had initial AP (10%-49%). Sixty-four (44.4%) passed (50%-100%), including one with 100%. See Table 6.3.2.

In the marking scheme of answers with octave errors ignored, 60% was the passing mark and 66 subjects (45.8%) passed; whereas in that with octave errors counted, 50% was the passing mark and 64 subjects (44.4%) passed. The numbers of subjects with passing marks in both schemes were similar. The 50% passing mark under LCK MusET could be justified statistically. The scores with octave errors counted were used solely in the analysis.

6.4. Hypothesis 1: LCK MusET is an effective instructional method enabling subjects to develop AP.

Out of 144 subjects, 37 (25.7%) received music training before entering MusH. Thirty (20.8%) had been playing the piano from less than one year to seven years, five (3.5%)

played the violin, viola, electronic piano and drum respectively for one year and two (1.4%) sang in the choir for one year. These activities did not lead them to develop AP since they gained no marks in the pretest. No more subjects (N=107, 74.3%) reported participating in any other music activities. See Table 6.4.1.

Table 6.4.1: Participation of Music Activities before Entering MusH

Music Activity	Year	Subject (N)	Percent	Total	Percent	Grand Total N	Grand Total percent
Piano Playing	< 1	1	0.7				
	1	12	8.3				
	2	7	4.8				
	3	5	3.5				
	4	4	2.8				
	7	1	0.7	30	20.8		
Violin Playing	1	2	1.4				
Viola Playing	1	1	0.7				
Electronic Piano Playing	1	1	0.7				
Drum Playing	1	1	0.7	5	3.5		
Choir Attending	1	2	1.4	2	1.4	37	25.7
Nil	/	107	74.3	107	74.3	107	74.3
Total	/	144	100.0	144	100.0	144	100.0

When studying music at MusH, subjects were able to participate in music activities outside. Those activities might help them develop AP. There were in total 221 responses in the 14 items from 144 subjects indicating that they participated in music activities outside MusH. All (N=217, 98.19%), except three (1.36%) "Yes" and one (0.45%) "Not Sure" responses, reported that the activities outside MusH exerted no help in developing AP. One AP10 and one AP7 claimed that playing the violin, flute and in the orchestra helped them develop AP because they had to tune the instruments. See Table 6.4.2.

Table 6.4.2: Music Activities Participation outside MusH at Time of Research

Music Activity	Subject (N)	Percent	Develop AP?		
			Yes (N)	No (N)	Not Sure (N)
Melodica Playing	8	5.6	0	7	1
Violin & Viola Playing	8	5.6	1	7	0
Flute Playing	2	1.4	1	1	0
Percussions & Recorder Playing	10	6.9	0	10	0
Ensemble & Orchestra Playing	10	6.9	1	9	0
Singing	19	13.2	0	19	0
Composing	1	0.7	0	1	0
Dance	19	13.2	0	19	0
Music class in school	144	100.0	0	144	0
Total	221	/	3	217	1

Out of 217 responses saying "No", one AP8 stated that she did not know how to tune the violin. One AP5 trumpet player claimed that trumpet and piano tones were different. One AP4 and one AP2 dancers reported that dancing emphasized rhythm only. One AP4 indicated that only RP was used in school music. Besides MusH, no institutions were reported employing AP as a medium of instruction or aural training, or teaching AP. In response to questionnaire item XIV. 4, no subjects mentioned learning music outside MusH being one of the five factors making them develop AP. The findings supported the idea that the music training outside MusH exerted no help in the acquisition of AP.

From 757 responses of the 18 items from 144 subjects having participated in music activities at MusH, 749 responses (98.94%) reflected that the activities helped them develop AP. Five (0.66%) claimed "No" and three (0.4%) indicated "Not Sure". See Table 6.4.3.

Table 6.4.3: Music Activities Participation at MusH to Develop AP

Music Activity	Subject (N)	Percent	Develop AP		
			Yes (N)	No (N)	Not Sure (N)
Piano Playing	144	100.0	143	0	1
Metallophone Playing	1	0.7	1	0	0
Xylophone Playing	3	2.0	3	0	0
Glockenspiel Playing	7	4.9	6	0	1
Melodica Playing	14	9.7	14	0	0
Electronic Piano Playing	4	2.8	4	0	0
Ensemble Playing	25	17.5	25	0	0
Sight-Playing	62	43.1	62	0	0
Singing	25	17.4	25	0	0
Sight-Singing	78	54.2	77	1	0
Composing	16	11.1	15	1	0
Conducting	19	13.2	19	0	0
Music Listening	144	100.0	143	0	1
Tonal Identification	134	93.1	134	0	0
Movement	7	4.9	7	0	0
Music Theory Learning	74	51.4	71	3	0
Total	757	/	749	5	3

One AP7, one AP4, two AP2 and one AP0 thought that playing the piano helped them

develop AP because they had to sing solfège when playing the piano. Two AP7 and two AP4 identified tones in the absolute sense through listening to the music they played. One AP5 claimed that playing the piano could enhance her tonal and general memory. One AP8 thought that singing tones when playing the metallophone, singing, composition, conducting and music listening helped in developing AP. One AP6 reported that singing notes in learning theory helped her develop AP.

One hundred and twenty-one (99.2%) AP1-10 subjects reported using AP strategy in the post-test. One (0.8%) AP2 of 23 years of age reported using both AP and RP. She came to MusH for three months. From examiners' observations, all 122 AP1-10 judged tones immediately and with certainty, and used AP. According to the instruction of the AP assessment, all answers had to be responded to within three seconds. Otherwise, no other answers could be written down on the answer sheets. Therefore, it was decided that 121 subjects used AP and the 23-year-old subject used AP or met the criteria of using AP in her responses.

The post-test showed that except for 22 subjects (15.3%), all (N=122, 84.7%) had possessed or had started to develop AP. Even though the 58 subjects (40.28%) gaining 10% to 49% had only initial AP, they were considered AP possessors. The other 64 subjects (44.44%) getting 50% to 100% had developed AP. The 144 subjects got a mean of 0% in the pretest and 42.86% (SD=27.94) in the post-test. The paired samples t-test showed that the difference was significant (t=-18.409, df=143, p=.000, 2 tailed). The 122 AP1-10 got a mean of 50.06% (SD=24.08) in the post-test and the difference was significant (t=-22, 961, df=121, p=.000, 2-tailed). The 64 AP5-10 subjects got a mean of 69.49% (SD=13.83) in the posttest and this difference was also significant (t=-40.190, df=63, p=.000, 2-tailed). Therefore, the participation in the music activities of LCK MusET is a significant factor making subjects develop AP.

6.4.1. Sub-Hypothesis 1.1: Subjects of different gender can develop AP.

Of 64 AP5-10 subjects, there were 34 boys (53.1%) and 30 girls (46.9%). Using the

Chi-square test, the number of boys was non-significantly more than that of girls (X^2=.25, df=1, p=.617). See Table 6.4.1.1.

Table 6.4.1.1: Frequency Analysis of All Subjects of Different Gender

Gender	AP0		Ap1-4		AP5-10		AP1-10		Total
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	
Boy	12	16.0	29	38.7	34	45.3	63	84.0	75
Girl	10	14.5	29	42.0	30	43.5	59	85.5	69
Total	22	15.3	58	40.3	64	44.4	122	84.7	144

The independent samples t-test showed that the mean score of boys (M=68.58, SD=13.71) was lower (MD=-0.76) than that of girls (M=70.51, SD=14.13) with a non-significant difference (t=-.554, df=62, p<.05, 2-tailed). See Table 6.4.1.2.

Table 6.4.1.2: Independent Samples T-Test of AP5-10 subjects' AP Achievement in Relation to Gender Difference

Descriptives

Gender		Number	Mean	Std. Deviation	Std. Error Mean
AP Achievement	Male	34	68.5829	13.71036	2.35131
	Female	30	70.5114	14.13053	2.57987

Independent Samples Test

Variances of AP Scores		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Standard Error	95% Confidence Interval of the Difference	
									Lower Bound	Upper Bound
AP Achieve-ment	Equal variances assumed	.000	.987	-.554	62	.582	-.1.9285	3.48393	-8.89273	5.03582
	Equal variances not assumed	/	/	-.552	60.502	.583	-.1.9285	3.49061	-8.90953	5.05262

The sub-hypothesis was accepted. Subjects of different gender can acquire AP.

6.4.2. Sub-Hypothesis 1.2: There is no significant difference in the post-test scores among AT, MS and SEN subjects.

All AT (N=3), 41.7% (N=43) of MS and 47.4% (N=18) of SEN belonged to the AP5-10 group. The 18 SEN subjects in the AP5-10 group comprised 28.6% (N=4) of the autistic

subjects, 60% (N=3) of the EBD subjects, 57.1% (N=4) of the LD subjects, all (N=3) of the SID subjects, 66.6% (N=2) of the moderate HI subjects, all (N=1) of the severe HI subjects and all (N=1) of the asthma subjects. All (N=3) AT, 85.4% (N=88) of MS and 81.6% (N=31) of SEN subjects belonged to the AP1-10 group. The 31 SEN were made up of 85.7% (N=12) of the autistic subjects, 80% (N=4) of the EBD subjects, 66.7% (N=2) of the SD subjects, 71.4% (N=5) of the LD subjects, all (N=3) of the SID subjects, all (N=4) of the HI subjects and all (N=1) of the asthma subjects. No MR subjects fell into this group since the only mild MR subject entered MusH for only three months. See Table 6.4.2.1.

Table 6.4.2.1: Prevalence of AP among All AT, MS and SEN Subjects

AP Grading / Category		AP0		AP1-4		AP5-10		AP1-10		Total	Percent
		N	Percent	N	Percent	N	Percent	N	Percent		
AT		0	0	0	0	3	100.0	3	100.0	3	2.1
MS		15	14.6	45	43.7	43	41.7	88	85.4	103	71.5
SEN		7	18.4	13	34.2	18	47.4	31	81.6	38	26.4
SEN	Mild MR	1	100.0	0	0	0	0	0	0	1	0.7
	Autistic	2	14.3	0	57.1	4	28.6	12	85.7	14	9.7
	EBD	1	20.0	1	20.0	3	60.0	4	80.0	5	3.5
	SD	1	33.3	2	66.7	0	0	2	66.7	3	2.1
	LD	2	28.6	1	14.3	4	57.1	5	71.4	7	4.8
	SID	0	0	0	0	3	100.0	3	100.0	3	2.1
	Moderate HI	0	0	1	33.3	2	66.7	3	100.0	4	2.8
	Severe HI	0	0	0	0	1	100.0	1	100.0	3	0.7
	Asthma	0	0	0	0	1	100.0	1	100.0	1	0.7
Total		22	15.3	58	40.3	64	44.4	122	84.7	144	100.0

Of 144 subjects (AT=3, 2.1%; MS=103, 71.5%; SEN=38, 26.4%), the unrelated one-way ANOVA showed that the mean post-test score of the AT was the highest (M=75.95, SD=23.37). It was 33.02% and 35.88% higher than those of the MS and SEN respectively. The second highest mean score was that of the MS (M=42.93, SD=27.59) and it was 2.86% higher than that of the SEN. The mean score of the SEN was the lowest (M=40.07, SD=28.16). But these differences were non-significant ($F=2.336$, $df=2, 141$, $p>.05$). Refer to Table 6.4.2.2.

Table 6.4.2.2: Unrelated One-way ANOVA of All AT, MS and SEN Subjects' AP Achievement

Descriptives

Educational Category	N	Mean	Standard Deviation	Standard Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
AT	3	75.9476	23.37286	13.49433	17.8862	134.0090	50.57	96.59
MS	103	42.9281	27.58621	2.71815	37.5366	48.3195	.00	100.00
SEN	38	40.0718	28.15945	4.56807	30.8160	49.3276	1.14	98.30
Total	144	42.8622	27.94025	2.32835	38.2598	47.4647	.00	100.00

ANOVA

AP Achievement	Sum of Squares	df	Mean Square	F	Significance
Between Groups	3580.260	2	1790.130	2.336	.100
Within Groups	108053.790	141	766.339	/	/
Total	111634.050	143	/	/	/

Considering only the 64 AP5-10 subjects (AT=3, 4.7%; MS=43, 67.2% SEN=18, 28.1%), the unrelated one-way ANOVA showed that the mean score of the AT was the highest (M=75.95, SD=23.37). It was 5.49% and 15.85% higher than those of the MS and SEN respectively. The second highest mean score was that of the MS (M=70.46, SD=13.75). It was 4.36% higher than that of the SEN. The mean score of the SEN was the lowest (M=66.10, SD=12.49). But these differences were non-significant (F=.972, df=2, 61, p>.05). See Table 6.4.2.3.

Table 6.4.2.3: Unrelated One-way ANOVA of AP5-10 AT, MS and SEN Subjects' AP Achievement

Descriptives

Educational Category	N	Mean	Standard Deviation	Standard Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
AT	3	75.9476	23.37286	13.49433	17.8862	134.0090	50.57	96.59
MS	43	70.4546	13.74749	2.09647	66.2237	74.6854	50.00	100.00
SEN	18	66.0985	12.48632	2.94305	59.8892	72.3078	50.00	98.30
Total	64	69.4869	13.83170	1.72896	66.0318	72.9420	50.00	100.00

ANOVA

AP Achievement	Sum of Squares	df	Mean Square	F	Significance
Between Groups	372.150	2	186.075	.972	.384
Within Groups	11680.748	61	191.488	/	/
Total	12052.898	63	/	/	/

The hypothesis was therefore accepted. Subjects of different aptitude, i.e. the AT, MS and SEN, can develop AP.

6.4.3. Sub-Hypothesis 1.3: There is no significant difference in the post-test scores among subjects of different age of onset in piano learning under 23 years of age.

Subjects commenced piano playing from two to 23 years of age. There were 58.3% to 100% of subjects in each age developing AP to AP1-10. Considering only the AP5-10, the rates were from 20% to 60.9%. See Table 6.4.3.1.

Table 6.4.3.1: Frequency of All Subjects' Age of Commencing Piano Playing

Age of Onset	AP0		AP1-4		AP5-10		AP1-10		Total
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	
2	5	41.7	3	25.0	4	33.3	7	58.3	12
3	7	22.6	9	29.0	15	48.4	24	77.4	31
4	2	8.7	7	30.4	14	60.9	21	91.3	23
5	3	18.7	6	37.5	7	43.8	13	81.3	16
6	2	11.8	7	41.2	8	47.0	15	88.2	17
7	0	0	7	53.8	6	46.2	13	100	13
8	0	0	9	64.3	5	35.7	14	100	14
9	1	1	2	40	2	40.0	4	80	5
10	0	0	3	75	1	25.0	4	100	4
11-16	2	2	2	40	1	20.0	3	60	5
17-23	0	0	3	75	1	25.0	4	100	4
Total	22	22	58	40.3	64	44.4	122	84.7	144

The maximum post-test scores ranged from 50.57% belonging to a subject starting to play the piano at the age of 10 (M=38.35, SD=13.35), 56.25% belonging to the one starting at 17 to 23 (M=39.06, SD=13.85), 73.30% belonging to the one starting at two (M=28.36, SD=28.63), to 100% belonging to the one starting at four (M=50.47, SD=27.13). There

were subjects therefore able to develop AP who commenced piano playing at any age between two to 23. Although there were differences in the mean scores, ranging from 28.36% (SD=28.63) at the onset age of two (N=12, 8.3%) to 50.47% (SD=27.13) at four (N=23, 15.97%), the differences were non-significant (F=.678, df=10, 133, p<.05) in the unrelated one-way ANOVA. Refer to Table 6.4.3.2.

Table 6.4.3.2: Unrelated One-way ANOVA of AP Achievement of All Subjects with Different Onset Age of Playing Piano

Descriptives

Age of Onset	N	Mean Scores	Standard Deviation	Standard Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
2	12	28.3617	28.63182	8.26529	10.1699	46.5535	.00	73.30
3	31	45.5279	31.71444	5.69608	33.8949	57.1608	2.27	96.59
4	23	50.4694	27.13337	5.65770	38.7360	62.2027	3.41	100.00
5	16	40.9446	28.77676	7.19419	25.6105	56.2787	.00	90.91
6	17	46.3570	31.06938	7.53543	30.3826	62.3314	.00	98.30
7	13	40.8217	19.80894	5.49401	28.8513	52.7922	11.36	67.61
8	14	43.5877	26.10825	6.97772	28.5132	58.6621	10.23	94.32
9	5	43.5227	33.42291	14.94718	2.0227	85.0227	1.14	81.25
10	4	38.3527	13.35383	6.67692	17.1038	59.6017	19.32	50.57
11-16	5	29.6591	30.88213	13.81091	8.6861	68.0043	1.14	77.27
17-23	4	39.0625	13.85071	6.92535	17.0229	61.1021	27.27	56.25
Total	144	42.8622	27.94025	2.32835	38.2598	47.4647	.00	100.00

ANOVA

AP Achievement	Sum of Squares	df	Mean Square	F	Significance
Between Groups	5415.288	10	541.529	.678	.743
Within Groups	106218.762	133	798.637	/	/
Total	111634.050	143	/	/	/

The hypothesis was accepted. The age of onset is not crucial in acquiring AP

6.4.4. Sub-Hypothesis 1.4: Singing or thinking of tones in piano playing is a significant factor in developing AP.

Out of 144 subjects, 136 (94.4%) sang or thought of tones when they practised the piano and eight (5.6%) did not. Of these eight subjects, four were AP0, one was AP1 and three

were AP2. Subjects singing or thinking of tones when practising the piano got a mean AP score of 44.68% (SD=27.59) and those not practising got 11.93% (SD=10.46). Subjects singing or thinking of tones in practising the piano got significantly higher scores (F=11.115, df=1, 141, p=.001, 2-tailed) than those who did not (MD=32.75) under the unrelated one-way ANOVA. The sub-hypothesis was accepted. See Table 6.4.4.1.

Table 6.4.4.1: Unrelated One-way ANOVA of AP Achievement of All Subjects Singing or Thinking of Tones in Practising Piano or Not

Descriptives

Singing / Thinking of Tones in Practising Piano		N	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
AP Achievement	yes	136	44.6817	27.59011	2.36583	40.0028	49.3606	.00	100.00
	no	8	11.9318	10.46354	3.69942	3.1841	20.6796	1.14	26.14
	Total	144	42.8622	27.94025	2.32835	38.2598	47.4647	.00	100.00

ANOVA

AP Achievement	Sum of Squares	df	Mean Square	F	Significance
Between Groups	8103.729	1	8103.729	11.115	.001
Within Groups	103530.320	141	729.087	/	/
Total	111634.050	143	/	/	/

6.4.5. Sub-Hypothesis 1.5: The more frequencies subjects sing or think of absolute solfège in practising the tone identification, practising the piano, playing the piano from memory, sight-playing, singing, sight-singing, music listening, composing, conducting and learning music theory, the higher will be their post-test scores.

All subjects had to take the piano performance. Other activities such as identifying tones, playing the piano from memory, sight-playing, singing, sight-singing, music listening, composition, conducting and learning music theory were optional. They took part in a mean of 63.99% of the activities. They reported singing or thinking of tones on 81.11% of the occasions, and on 18.89% of the occasions not doing this. Of these 81.11% occasions,

they reported using AP in 99.11% and RP in 0.89% of the occasions. See Table 6.4.5.1.

Table 6.4.5.1: Pitch Strategies Used in Music Learning

Activities	Number (%)	Sing/Think of tones?		Pitch Strategy Used	
		Yes N(valid %)	No N(valid %)	AP N(valid %)	RP N(valid %)
Playing piano	144(100.00)	136(94.40)	8(5.60)	136(100.00)	0(0.00)
Identifying tones	16(11.10)	12(75.00)	4(25.00)	12(100.00)	0(0.00)
Memory Playing	105(72.90)	101(96.20)	4(3.80)	101(100.00)	0(0.00)
Sight-playing	72(50.00)	63(87.50)	9(12.50)	63(100.00)	0(0.00)
Singing	140(97.20)	87(62.10)	53(37.90)	82 (94.20)	5(5.80)
Sight-sing	80(55.60)	74(92.50)	6(7.50)	74(100.00)	0(0.00)
Listening	143(99.30)	84(58.70)	59(41.30)	84(100.00)	0(0.00)
Composing	33(22.90)	32(97.00)	1(3.00)	32(100.00)	0(0.00)
Conducting	24(16.70)	24(100.00)	0(0.00)	24(100.00)	0(0.00)
Learning Theory	74(51.40)	61(82.40)	13(17.60)	60(98.40)	1(1.60)
Mean	83.1(63.99)	67.4(81.11)	15.7(18.89)	66.8(99.11)	0.6(0.89)

The Spearman's correlation showed that the144 subjects' AP achievement was positively correlated (rho=.744, df=142, p=.000, 2-tailed) to their frequencies in using AP in music activities. The effect size, r=.74, was strong (Cohen, 1988). The more frequently they used AP to sing or think of tones in music activities, the higher scores they would gain in the post-test. The sub-hypothesis was accepted. Singing or thinking of absolute solfège in music activities is a significant factor in developing AP.

6.4.6. Sub-Hypothesis 1.6: Subjects playing pianos with the accurate tuning of A440 get significantly higher post-test scores than those without.

Out of 144 subjects, 140 (97.2%) used the piano to practise. Of these 140 subjects, five (3.6%) indicated that their pianos were out of tune. Of these five subjects, one (0.7%) claimed the piano was too old to be in tune. One (0.7%) reported the piano not tuned to A440. Three (2.1%) claimed their pianos not tuned three times a year. Two of these subjects were AP0, one was AP1, one was AP2 and one was AP6. Subjects (N=135, 96.4%) with the accurate tuning got a mean score of 44.54% (SD=27.58) which was significantly higher (F=4.08, df=2, 141, p=.019) than those with the inaccurate tuning (M=19.89,

SD=27.92) under the unrelated one-way ANOVA. The sub-hypothesis was accepted. The accurate piano tuning is a significant factor in developing AP. See Table 6.4.6.1.

Table 6.4.6.1: Unrelated One-way ANOVA of AP Achievement of 140 Subjects with In-tuned and Not In-tuned Pianos

Descriptives

In-tuned Piano?	N	Mean	Standard Deviation	Standard Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Yes	135	44.5371	27.57695	2.37345	39.8428	49.2313	.00	100.00
No	5	19.8864	27.92196	12.48708	-14.7833	54.5561	.00	67.61
Inapplicable	4	15.0568	12.90244	6.45122	-5.4738	35.5875	.00	28.41
Total	144	42.8622	27.94025	2.32835	38.2598	47.4647	.00	100.00

ANOVA

AP Achievement	Sum of Squares	df	Mean Square	F	Significance
Between Groups	6110.694	2	3055.347	4.083	.019
Within Groups	105523.356	141	748.393	/	/
Total	111634.050	143	/	/	/

6.4.7. Sub-Hypothesis 1.7: The longer the time subjects play the piano, the higher the scores they will gain in the post-test.

Subjects (N=17, 11.8%) who started to develop AP within one to two months of learning the piano attained a mean of AP1 (M=16.21, SD=19.55). Subjects (N=14, 9.7%) attained AP5 after a mean of two years learning (M=55.03, SD=25.13). Subjects attained AP8 or AP9 after a mean of seven (N=2, 1.4%, M=92.61, SD=2.41) to eight (N=3, 2.1%, M=83.71, SD=15.00) years learning the piano. The unrelated one-way ANOVA showed significant differences in the post-test scores among subjects playing the piano from 1-2 months to eight years (F=10.512, df=13, 130, p=.000). See Table 6.4.7.1.

Table 6.4.7: Unrelated One-way ANOVA of AP Achievement of All Subjects with Different Durations in Piano Playing

Descriptives

Duration in Playing Piano	N	Mean Scores	Standard Deviation	Standard Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1-2 months	17	16.2099	19.54776	4.74103	6.1594	26.2604	.00	77.27
3-4 months	8	23.9347	21.17777	7.48747	6.2296	41.6397	1.14	56.82
5-6 months	13	18.4878	13.58817	3.76868	10.2765	26.6990	.00	51.14
7-8 months	7	28.0844	26.19159	9.89949	3.8612	52.3076	3.41	64.20
9-10 months	8	18.3239	12.46583	4.40733	7.9022	28.7456	.00	39.20
10-11 months	4	30.5398	15.72797	7.86398	5.5131	55.5665	10.23	46.02
1 year	37	49.0786	20.16908	3.31578	42.3539	55.8033	1.14	98.30
2 years	14	55.0326	25.12962	6.71617	40.5232	69.5420	3.41	81.25
3 years	8	70.0284	19.72394	6.97347	53.5388	86.5180	39.20	95.45
4 years	16	59.9432	22.81423	5.70356	47.7863	72.1000	4.55	96.59
5 years	5	64.2045	25.03549	11.19621	33.1189	95.2902	30.68	86.93
6 years	2	68.1818	25.71297	18.18182	-162.8401	299.2037	50.00	86.36
7 years	2	92.6136	2.41059	1.70455	70.9553	114.2719	90.91	94.32
8 years	3	83.7121	15.00402	8.66257	46.4401	120.9842	70.45	100.00
Total	144	42.8622	27.94025	2.32835	38.2598	47.4647	.00	100.00

ANOVA

AP Achievement	Sum of Squares	df	Mean Square	F	Significance
Between Groups	57210.319	13	4400.794	10.512	.000
Within Groups	54423.730	130	418.644	/	/
Total	111634.050	143	/	/	/

The Tukey HSD test showed that subjects learning the piano for five to eight years (MD=45.10, p=.000), four years (MD=34.26, SE=6.13, p=.000), three years (MD=40.65, SE=5.65, p=.000), two years (MD=29.62, SE=5.95, p=.000) and one year (MD=21.03, SE=4.31, p=.000) got significantly higher mean scores than those learning the piano for less than one year. The Spearman's correlation showed that the 144 subjects' post -test scores were positively correlated to the duration of playing the piano (rho=.683, df=142, p=.000, 2-tailed). The effect size, r=.68, was great (Cohen, 1988). The longer subjects played the piano, the higher scores they would get in the post-test. The sub-hypothesis was

accepted. The duration of playing the piano is a significant factor in developing AP.

6.4.8. Sub-Hypothesis 1.8: Subjects with AP who use the piano to practise get significantly higher post-test scores than those using the electronic piano.

Of the 144 subjects, 140 subjects (97.2%) used the piano to practise while four (2.8%) used the electronic piano. Two of this later group belonged to AP0 and two to AP2. Subjects using the piano to practise got a mean score of 43.66% (SD=27.87) in the post-test and those using the electronic piano obtained 15.06% (SD=12.90). Subjects practising the piano got a significantly higher mean score than those practising the electronic piano (t=2.041, df=142, p=.043, 2-tailed) under the independent samples t-test. The sub-hypothesis was accepted. Familiarity of tones is a significant factor in developing AP. See Table 6.4.8.1.

Table 6.4.8.1: Independent Samples T-Test of All Subjects Using Pianos or Electronic Pianos to Practise

Group Statistics

Instrument for Practice		N	Mean	Std. Deviation	Std. Error Mean
AP Achievement	Piano	140	43.6567	27.86836	2.35531
	Electronic piano	4	15.0568	12.90244	6.45122

Independent Samples Test

Variances of AP scores		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Standard Error Difference	95% Confidence Interval of the Difference	
									Lower Bound	Upper Bound
AP Achiev-ement	Equal variances assumed	3.49	.064	2.041	142	.043	28.5999	14.01406	.89669	56.30301
	Equal variances not assumed	0	/	4.164	3.852	.015	28.5999	6.86773	9.23869	47.96101

6.4.9. Sub-Hypothesis 1.9: The more time subjects practise the piano, the higher will be their post-test scores.

Out of 140 (97.2%) subjects practising the piano, most subjects (N=82, 58.5%) practised

four hours or less per week. See Table 6.4.9.1.

Table 6.4.9.1: Time for Practising Piano Per Week of 140 Subjects

Time for Practising Piano	Frequency	Percent	Cumulative Percent
Less than 3 hrs a week	36	25.7	25.7
3-4hrs a week	46	32.9	58.6
5-6hrs a week	39	27.9	86.4
7-8hrs a week	13	9.3	95.7
More than 9 hrs a week	6	4.3	100.0
Total	140	100.0	/

The Spearman's correlation showed that there was a positive correlation (rho=.571, df=138, p=.000, 2-tailed) between the 140 subjects' piano practising time and their post-test scores. The effect size, r=.57, was great (Cohen, 1988). The sub-hypothesis was accepted. The duration in the piano practice is a significant factor in developing AP.

6.4.10. Sub-Hypothesis 1.10: There is no significant difference in the post-test scores between subjects of speaking Cantonese and English.

Out of 144 subjects, 140 (97.2%) subjects' first language was Chinese and four (2.8%) were English. The four English speakers were AP2, AP3, AP5 and AP7. They achieved a mean score of 49.57% (SD=23.73) ranging from 26.14% to 79.55% while the Cantonese speakers got 42.67% (SD=28.10). The independent samples t-test showed that the mean score of the English speakers was not significantly higher (t=-.486, df=142, p>.05, 2-tailed) than that of the Cantonese speakers. The null sub-hypothesis was accepted. Subjects speaking either a tonal or a phonetic language can acquire AP. Language background is not a factor in developing AP. See Table 6.4.10.1.

Table 6.4.10.1: Independent Samples T-Test of AP Achievement of All Subjects Speaking Chinese or English

Group Statistics

First Language		Number	Mean	Std. Deviation	Std. Error Mean
AP Achievement	Chinese	140	42.6705	28.10038	2.37492
	English	4	49.5739	23.73420	11.86710

Independent Samples Test

Variances of AP scores		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2tailed)	Mean Difference	Standard Error Difference	95% Confidence Interval of the Difference	
									Lower Bound	Upper Bound
AP Achievement	Equal variances assumed	.599	.440	-.486	142	.628	-6.9034	14.20629	-34.98654	21.17975
	Equal variances not assumed	/	/	-.570	3.245	.606	-6.9034	12.10241	-43.82471	30.01792

6.4.11. Sub-Hypothesis 1.11: Auditory hypersensitivity is not a factor of developing AP.

Of the AP5-10 group, there were four (28.6% of 14) auditory hypersensitive (autistic) and 46 (44.4% of 103 MS and 3 AT) normal hearing (43 MS and three AT) subjects. Of the AP1 to 10, there were 12 (85.7%) auditory hypersensitive (autistic) and 91 (85.9%) normal hearing (88 MS and three AT) subjects. The prevalence of AP in auditory hypersensitive subjects was lower (-15.8% in AP5-10 and -0.2% in AP1-10) than that of the normal hearing subjects. Three of the HI (75.0% of 4 HI) were AP5-10 and totally four (100%) belonged to AP1-10. The prevalence rates were 30.6% and 46.4% in AP5-10, and 14.1% and 14.3% in AP1-10 higher than those of normal hearing and auditory hypersensitive subjects respectively.

The unrelated one-way ANOVA was used to analyze the mean post-test scores of all 14 auditory hypersensitive (11.3%), 106 (103 MS and 3 AT) normal hearing (85.5%) and four (3.2%) HI (three moderate HI and one severe HI) subjects. The mean score of the HI was the highest (M=50.85, SD=28.57). The second highest was that of the normal hearing (M=43.86, SD=27.93). The lowest belonged to that of the auditory hypersensitive (M=32.55, SD=20.72). But these differences were non-significant (F=1.245, df=2, 121, p>.05). The sub-hypothesis was accepted. Auditory hypersensitivity is not a factor in developing AP. See Table 6.4.11.1.

Table 6.4.11.1: Unrelated One-way ANOVA of AP Achievement of 14 Auditory Hypersensitive, 106 Normal Hearing and Four HI Subjects

Descriptives

Hearing Group	N	Mean	Standard Deviation	Standard Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Auditory Hypersensitivity	14	32.5478	20.71564	5.53649	20.5878	44.5096	2.27	60.80
Normal Hearing	106	43.8626	27.92725	2.71253	38.4841	49.2410	.00	100.00
HI	4	50.8523	28.56962	14.28481	5.3916	96.3129	12.23	76.14
Total	124	42.8107	27.31486	2.45295	37.9552	47.6661	.00	100.00

ANOVA

AP Achievement	Sum of Squares	df	Mean Square	F	Significance
Between Groups	1850.272	2	925.136	1.245	.292
Within Groups	89920.222	121	743.142	/	/
Total	91770.495	123	/	/	/

6.4.12. Sub-Hypothesis 1.12: There is no significant difference in the post-test scores between subjects who practise and those who do not practise pitch identification.

There were 16 subjects (11.1%) who practised pitch identification and 128 (88.9%) subjects who did not out of the 144 subjects. Of these 16 subjects, three (18.8%) were AP0, three (18.8%) were AP1-4, and ten were (62.4%) AP5-10. There were 43.6% more of the AP5-10 practising pitch identification than of the AP0 and AP1-4 respectively. See Table 6.4.12.1.

Table 6.4.12.1: Frequency of 144 Subjects with or without Practising Pitch Identification

Practise Pitch Identification?	AP0			AP1-4			AP5-10			AP1-10			Total N	Percent
	N	Percent	Valid Percent	N	Percent	Valid Percent	N	Percent	Valid Percent	N	Percent	Valid Percent		
Yes	3	2.1	18.8	3	2.1	18.8	10	6.9	62.4	13	9.0	81.2	16	11.1
No	19	13.2	14.8	55	38.2	43.0	54	37.5	42.2	109	75.7	85.2	128	88.9
Total	22	15.3	15.3	58	40.3	40.3	64	44.4	44.4	122	84.7	84.7	144	100.0

Considering all the 144 subjects, the independent samples t-test showed that the subjects

(N=16) who practised pitch identification (M=49.15, SD=34.01) attained a higher mean score (MD=7.12) than those (N=128) who did not (M=40.03, SD=27.13) with a non-significant difference (t=.961, df=142, p>.05, 2-tailed). See Table 6.4.12.3.

Table 6.4.12.2: Independent Samples T-Test of AP Achievement of All Subjects with or without Practising Pitch Identification

Group Statistics

Pitch Identification Practice		Number	Mean	Std. Deviation	Std. Error Mean
AP Achievement	Yes	16	49.1478	34.01001	8.50250
	no	128	42.0321	27.12464	2.39750

Independent Samples Test

Variances of AP Scores		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Standard Error Difference	95% Confidence Interval of the Difference	
									Lower Bound	Upper Bound
AP Achievement	Equal variances assumed	2.532	.114	.961	142	.338	7.1157	7.40666	-7.52586	21.75727
	Equal variances not assumed	/	/	.805	17.467	.431	7.1157	8.83406	-11.48463	25.71604

Considering only the AP5-10, the independent samples t-test showed that the subjects practising pitch identification (M=72.44, SD=16.13) did not get significantly higher mean scores (t=.733, df=62, p=>.05, 2-tailed) than those who did not practise pitch identification (M=68.94, SD=13.46). See Table 6.4.12.3.

Table 6.4.12.3: Independent Samples T-Test of AP Achievement of AP5-10 Subjects with and without Pitch Identification Practice

Group Statistics

Pitch Identification Practice		Number	Mean	Std. Deviation	Std. Error Mean
AP Achievement	Yes	10	72.4434	16.13327	5.10179
	No	54	68.9394	13.46327	1.83212

Independent Samples Test

Variance of AP Score		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Standard Error Difference	95% Confidence Interval the Difference	
									Lower Bound	Upper Bound
AP Achievement	Equal variances assumed	1.086	.301	.733	62	.466	3.5040	4.77935	-6.04983	13.05773
	Equal variances not assumed	/	/	.646	11.439	.531	3.5040	5.42078	-8.37152	15.37943

The null sub-hypothesis was accepted. The pitch identification practice was not a factor in developing AP. Subjects who do not practise pitch identification can develop AP as well .

6.4.13. Sub-Hypothesis 1.13: There is no significant difference in the post-test scores between subjects commencing piano playing at two to six years of age and seven to 23.

The 64 AP5 to 10 subjects were regrouped into two age groups. One group (N=48, 75.0 %) started to play the piano at two to six years of age, getting a mean post-test score of 70.82% (SD=14.01). Another group (N=16, 25.0%) started at seven to 23 years old, having a mean score of 65.48% (SD=12.86). The independent samples t-test showed that the subjects commencing at the age of two to six did not get a significantly higher score than those commencing at seven to 23 (t=1.35, df=62, p>.05, 2-tailed). The sub-hypothesis was accepted. Music training at the age of six or below is not a factor in acquiring significantly higher AP achievement. See Table 6.4.13.1.

Table 6.4.13.1: Independent Samples T-Test of AP Achievement of AP1-10 Subjects in Commencing Piano Playing before and after Six Years of Age

Group Statistics

Age of Onset		Number	Mean	Std. Deviation	Std. Error Mean
AP Achievement	<6 yrs of age	48	70.8215	14.01321	2.02263
	>7yrs of age	16	65.4831	12.86215	3.21554

Independent Samples Test

Variances of AP scores		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Standard Error Difference	95% Confidence Interval of the Difference	
									Lower Bound	Upper Bound
AP Achievement	Equal variances assumed	.155	.695	1.346	62	.183	5.3384	3.96743	-2.59240	13.26915
	Equal variances not assumed	/	/	1.405	27.828	.171	5.3384	3.79878	-2.44524	13.12199

6.14.14. Sub-Hypothesis 1.14: Inheritance from parents or grandparents is not a factor in developing AP.

Of 144 subjects, nobody reported that their family members were professional musicians or learnt music up to a professional standard. Fifteen subjects (10.4%) reported that their family members possessed AP. Nine members were their brothers. Eight were sisters. All these 17 AP family members were piano students or ex-students of MusH. None of their parents or grandparents was reported to have AP. No subject having AP inherited from parents or grandparents could be traced. No subject pointed out "inherit AP from parents or grandparents" being one of the five factors in the questionnaire. So, inheritance does not seem to be a factor in developing AP. The sub-hypothesis was accepted.

6.4.15. Sub-Hypothesis 1.15: Tinnitus is not a factor in developing AP.

There was no record in the 144 subjects' personal files or information sheets that any subject suffered from tinnitus. In the questionnaire, no subjects reported having tinnitus. None reflected that the "ear ringing sound" was one of the five factors in developing AP. There was no evidence that tinnitus exerted an influence in developing AP. The sub-hypothesis was accepted.

6.4.16. Sub-Hypothesis 1.16: Chromesthesia is not a factor in developing AP.

There was no record in all subjects' personal files or information sheets that any subject had chromesthesia. In the questionnaire, no subjects reported having chromesthesia. No subjects reported "associating tones to colours" as one of the five factors in developing AP. There was no evidence that the AP development was related to chromesthesia. The sub-hypothesis was accepted.

6.4.17. Sub-Hypothesis 1.17: Subjects with AP are more likely to report following LCK MusET to identify notes, sing solfège when practising the piano, practise the piano without singing solfège, play the piano from memory, sight-play, sing, sight-sing, listen to music, compose, conduct, learn music theory and have the piano tuned in-tune rather than to learn music outside MusH, inherit AP from parents or grandparents, compare tones to ear ringing sounds and associate tones to colours as factors in the development of AP.

From the 556 subjective responses of the 122 AP1-10, the most important factor identified in developing AP was to follow LCK MusET to sing solfège in practising the piano (N=58, 10.43% in AP1-4 and N=61, 10.97% in AP5-10, with a total N=119, 21.40%). The next was to have pianos in tune (N=54, 9.71% in AP1-4 and N=57, 10.25% in AP5-10, with total N=111, 19.96%). The third was to follow LCK MusET to play the piano without singing solfège (N=51, 9.17% in AP1-4 and N=43, 7.73% in AP5-10, with a total N=94, 16.90%). These three factors represented 58.26% (N=324). Other supporting factors were to follow LCK MusET to listen to music (N=51, 9.17%), play the piano from memory (N=49, 8.81%), sight-sing (N=43, 7.74%), sing (N=34, 6.12%) and sight-play (N=29, 5.22%). Other minor factors were to follow LCK MusET to identify notes (N=14, 2.52%), learn music theory (N=6, 1.08%), compose (N=4, 0.72%) and conduct music (N=2, 0.36%). Three factors exerted no influence, i.e. to learn music outside MusH, inherit from parents and grandparents, and compare tones to ear ringing sounds. No other factors were mentioned. The hypothesis was accepted. See Table 6.4.17.1.

Table 6.4.17.1: Factors to Develop AP

Order	Factors	AP1-4 Number of Choices	Percent	AP5-10 Number of Choices	Percent	Total Number of Choices	Total Percent	Cumulative Percent
1	Sing solfège in practising piano	58	10.43	61	10.97	119	21.40	21.40
2	Piano tuned in tune	54	9.71	57	10.25	111	19.96	41.36
3	Practise piano without singing solfège	51	9.17	43	7.73	94	16.90	58.26
4	Listen to music	23	4.13	28	5.04	51	9.17	67.43
5	Play from memory	20	3.60	29	5.21	49	8.81	76.24
6	Sight-sing	15	2.70	28	5.04	43	7.74	83.98
7	Sing	15	2.70	19	3.42	34	6.12	90.10
8	Sight-play	7	1.26	22	3.96	29	5.22	95.32
9	Identify notes	4	0.72	10	1.80	14	2.52	97.84
10	Learn music theory	4	0.72	2	0.36	6	1.08	98.92
11	Compose music	0	0.00	4	0.72	4	0.72	99.64
12	Conduct music	1	0.18	1	0.00	2	0.36	100.00
13	Learn music elsewhere	0	0.00	0	0.00	0	0.00	100.00
14	Inherent from parents	0	0.00	0	0.00	0	0.00	100.00
15	Compare tones to ear ringing sounds	0	0.00	0	0.00	0	0.00	100.00
16	Chromesthesia	0	0.00	0	0.00	0	0.00	100.00
Total		252	45.32	304	54.68	556	100.00	100.00

6.4.18. Codetta

The findings in the experiment supported the hypothesis that the music activities of LCK MusET were the media which trained subjects to develop AP. The activities included singing and thinking of absolute solfège in music activities, playing the piano and the accurate piano tuning. On the other hand, gender, aptitude, the age of onset, language background, auditory hypersensitivity, pitch identification practice, inheritance, tinnitus and chromesthesia were not influential factors. All subjects indicated that the music activities (98.94%) at MusH helped them to develop AP. No institutes or activities besides MusH taught them AP or used absolute solfège in teaching AP. In identifying five factors to develop AP, subjects indicated singing solfège in the piano playing, having pianos in tune, playing the piano, music listening, playing the piano from memory, sight-singing, singing, sight-playing, identifying tones, learning music theory, composing and conducting

as factors. To learn music outside MusH, inherit from parents or grandparents, compare tones to ear ringing sounds and chromesthesia were not factors of developing AP. The findings from the experiment and subjects' reports were consistent. Therefore, the main hypothesis that LCK MusET is an effective method enabling subjects to develop AP was accepted.

6.5. Hypothesis 2: Interest in playing the piano is a significant factor for subjects to acquire AP under LCK MusET.

Out of 144 subjects, two subjects (1.4%) had no interest, 10 (6.9%) had little interest, 65 (45.1%) had moderate interest, 58 (40.3%) had great interest and nine (6.3%) had very great interest in playing the piano. The moderate to great interest comprised 85.4%. The unrelated one-way ANOVA found the differences of the mean AP scores of subjects with different levels of interest significant (F=4.033, df=4, 139, p=.004). See Table 6.5.1.

Table 6.5.1: Unrelated One-way ANOVA of AP Achievement of All Subjects with Different Interest in Piano Playing

Descriptives

Levels of Interest		N	Mean	Standard Deviation	Standard Error	95% Confidence Interval for Mean		Min.	Max.
						Lower Bound	Upper Bound		
AP Achie-vement	No	2	55.9659	19.68650	13.92045	-120.9102	232.8421	42.05	69.89
	Little	10	14.4886	29.18542	9.22924	-6.3894	35.3666	.00	94.32
	Moderate	65	40.6469	25.48739	3.16132	34.3314	46.9623	1.14	90.91
	Great	58	47.6489	27.51616	3.61305	40.4139	54.8839	.00	100.00
	Extremely great	9	55.9975	29.85404	9.95135	33.0496	78.9453	11.36	98.30
	Total	144	42.8228	27.92473	2.32706	38.22229	47.4227	.00	100.00

ANOVA

AP Achievement	Sum of Squares	df	Mean Square	F	Significance
Between Groups	11594.523	4	2898.631	4.033	.004
Within Groups	99915.542	139	718.817	/	/
Total	111510.066	143	/	/	/

The Tukey HSD test showed that significant differences lay between the subjects with little interest and those with moderate interest (MD=-26.19, SE=9.11, p=.037), great interest

(MD=-33.23, SE=9.18, p=.004) and extremely great interest (MD=-41.51, SE=12.32, p=.009). See Table 6.5.2.

Table 6.5.2: Tukey HSD Test of AP Achievement of All Subjects with Different Interest in Piano Playing

Levels of Interest in Playing Piano		Mean Different	Standard Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
No interest	Little interest	41.4773	20.77718	.273	-15.9495	98.9041
	Moderate interest	15.2928	19.25647	.932	-37.9309	68.5164
	Great interest	8.2484	19.29113	.993	-45.0710	61.5679
	Extremely great interest	-.0316	20.96868	1.000	-57.9876	57.9245
little interest	no interest	-41.4773	20.77718	.273	-98.9041	15.9495
	Moderate interest	-26.1845*	9.11140	.037	-51.3678	-1.0012
	Great interest	-33.2288*	9.18441	.004	-58.6140	-7.8437
	Extremely great interest	-41.5088*	12.32442	.009	-75.5727	-7.4449
moderate interest	no interest	-15.2928	19.25647	.932	-68.5164	37.9309
	Little interest	26.1845*	9.11140	.037	1.0012	51.3678
	Great interest	-7.0443	4.84499	.594	-20.4356	6.3469
	Extremely great interest	-15.3244	9.54001	.496	-41.6923	11.0436
great interest	no interest	-8.2484	19.29113	.993	-61.5679	45.0710
	Little interest	33.2288*	9.18441	.004	7.8437	58.6140
	Moderate interest	7.0443	4.84499	.594	-6.3469	20.4356
	Extremely great interest	-8.2800	9.60977	.910	-34.8408	18.2808
extremely great interest	no interest	.0316	20.96868	1.000	-57.9245	57.9876
	Little interest	41.5088*	12.32442	.009	7.4449	75.5727
	Moderate interest	15.3244	9.54001	.496	-11.0436	41.6923
	great interest	8.2800	9.60977	.910	-18.2808	34.8408

* The mean difference is significant at the .05 level.

6.5.1. Sub-Hypothesis 2.1: The more interest subjects have in playing piano, the higher will be their post-test scores.

The Spearman's correlation showed that the 144 subjects' interest in playing the piano was positively correlated to their post-test scores (rho=.250, df=142, p=.003). The correlation was significant though the effect size, r=.25, was small (Cohen, 1988). The more interest subjects have in playing the piano, the higher would be the AP scores. The sub-hypothesis was accepted.

6.5.2. Codetta

Based on the findings that the differences of the mean scores among subjects with different

levels of interest in playing the piano were significant and the more interest subjects had in playing the piano the higher the mean scores they obtained, the main hypothesis was accepted. Interest in learning the piano exerts an influence on the AP acquisition.

6.6. Hypothesis 3: There is a significant difference in the post-test scores between subjects with and without attention problems under LCK MusET.

Twenty-four (16.7% of 144) subjects were reported by examiners as having attention and one (0.7%) having stress problems in taking the post-test. Two were the MS, one was the mild MR, 12 were the autistic, five were the EBD, one was the SD, two were the LD and one was the severe HI. One MS had stress problem. The independent samples t-test found that the mean score of the subjects (N=25, 17.4%) having attention and stress problems (M=32.34, SD=26.33) was lower than (MD=-12.73) those (N=119, 82.6%) without (M=45.08, SD=27.87). The difference was significant (t=-2.096, df=142, p=.038, 2-tailed). The hypothesis was accepted. Attention influences the AP achievement. See Table 6.6.1.

Table 6.6.1: Independent Samples T-Test of All Subjects with or without Attention or Stress Problems

Group Statistics

Attention or Stress problem		Number	Mean	Std. Deviation	Std. Error Mean
AP Achievement	Yes	25	32.3409	26.32759	5.26552
	No	119	45.0726	27.86921	2.55477

Independent Samples Test

Variances of AP Scores		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower Bound	Upper Bound
AP Achieve-ment	Equal variances assumed	.113	.737	-2.096	142	.038	-12.7317	6.07545	-24.74169	-.72167
	Equal variances not assumed	/	/	-2.175	36.221	.036	-12.7317	5.85256	-24.59871	-.86465

6.7. Hypothesis 4: There is a correlation among AP subjects' age, age of commencing piano playing at MusH, duration of piano playing, latest piano grades, time for practising the piano and total frequencies of using AP in music activities and post-test scores under LCK MusET.

The multiple linear regression was used to analyze the data of the 122 AP1-10 subjects' age, age of commencing the piano playing at MusH, duration of the piano playing, latest piano grades, time for practising piano, total frequency of using AP in music activities, post-test scores and the interrelationship of these parameters. From the correlation matrix, it was known that the subjects' age (r=.157, df=120, p=.042), duration of the piano playing (r=.601, df=120, p=.000), latest piano grades (r=.702, df=120, p=.000), time for practising the piano (r=.437, df=120, p=.000) and frequency of using AP (r=.693, df=120, p=.000) were positively correlated to their post-test scores. In contrast, age of commencing the piano playing was negatively correlated (r=-.175, df=120, p=.000). The older the subjects, the younger they commenced the piano playing, the longer they played the piano, the higher their piano grades, the more time they practised the piano or the higher frequency they used AP, the higher would be their AP scores.

From the regression model, the multiple correlation coefficient (R=.630) showed that the subjects' age, age of commencing piano playing, duration of playing the piano, latest piano grades, time for practising the piano and frequency of using AP were predictor variables of the AP achievement. The effect size, R=.6, was great (Cohen, 1988). The adjusted R^2 (R^2=.611) showed that 61% of the variance in the AP achievement could be predicted from these six variables. The ANOVA table showed a similar result that these six variables were significant predictors (F=32.689, df=6, 115, p=.000).

The regression coefficients table showed that the subjects' piano grades (t=3.882, p=.000), frequency of using AP (t=2.849, p=.005), time spent on practising the piano (t=2.864, p=.005), duration of playing the piano (t=2.234, p=.027) and age (t=-2.111, p=.037) were significant predictors when all variables were used together to predict the AP achievement.

The subjects' age of commencing the piano playing was non-significant (t=1.366, p>.05). The latest music grade attained was the most significant predictor among all of them. Except age (β=-.685), the latest grades (β=.429), duration of playing the piano (β=.404), frequency of using AP (β=.262) and time spent on practising the piano (β=.180) were, in order, positively correlated to the AP achievement. The higher the subjects' grades, the more time they practised the piano, the more frequently they used AP, the longer they played the piano and the younger their age, the higher would be the AP achievement. The subjects' age of commencing the piano was not as significant as the other five variables when considered together to predict the AP achievement. Nevertheless, this variable, when used alone, was still a significant predictor. But it was negatively correlated. Therefore, the hypothesis was accepted. See Appendix VII.1, Table 6.7.1, pp.448-449.

6.8. Findings of Other Research Questions

6.8.1. Question 1: What is the time needed for subjects to develop AP under LCK MusET?

6.8.1.1. Sub-Question 1.1: What is the shortest time for subjects to start to develop AP?

Out of the 144 subjects, 17 (11.8%) subjects had been playing the piano for one to two months. Eight (47.1%) were AP0, eight (47.1%) were AP1- 4 and one (5.8%) was AP7. The subjects playing the piano longer than two months had even higher prevalence rates than this, ranging from 57.2% to 100% in AP1-10. See Table 6.8.1.1.1.

Table 6.8.1.1.1: Frequency of All Subjects' Duration in Playing Piano

Duration	AP0		AP1-4		AP5-10		AP1-10		Total
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	
1-2 months	8	47.1	8	47.1	1	5.8	9	52.9	17
3-4 months	3	37.5	4	50.0	1	12.5	5	62.5	8
5-6 months	4	30.8	8	61.5	1	7.7	9	69.2	13
7-8 months	3	42.8	2	28.6	2	28.6	4	57.2	7
9-10 months	1	12.5	7	87.5	0	0	7	87.5	8
11-12 months	0	0	4	100.0	0	0	4	100.0	4
1 year	1	2.7	17	45.9	19	51.4	36	97.3	37
2 years	1	7.1	2	14.3	11	78.6	13	92.9	14
3 years	0	0	2	25.0	6	75.0	8	100.0	8
4 years	1	6.3	2	12.5	13	81.2	15	93.7	16
5 years	0	0	2	40.0	3	60.0	5	100.0	5
6 years	0	0	0	0	2	100.0	2	100.0	2
7 years	0	0	0	0	2	100.0	2	100.0	2
8 years	0	0	0	0	3	100.0	3	100.0	3
Total	22	15.3	58	40.3	64	44.4	122	84.7	144

Subjects learning the piano for one to two months (N=17, 11.8%) achieved a mean AP score of 16.21% (SD=19.55). It was the lowest among all. They attained a mean of AP1, with the maximum score of 77.27%. All other subjects (N=127, 88.2%) playing the piano longer than this period attained mean scores higher than this, ranging from 18.32% (SD=12.47) at nine to ten months (N=8, 5.6%) to 92.61% (SD=2.41) at seven years (N=2, 1.4%). See Table 6.4.7.1.

The one-way ANOVA found significant differences among the mean AP scores of subjects playing the piano for different durations (F=10.512, df=13, 130, p=.000). See Table 6.8.1.1.2.

Table 6.8.1.1.2: Unrelated One-Way ANOVA of AP Achievement of All Subjects Playing Pianos for Different Durations

AP Achievement	Sum of Square	df	Mean Square	F	Sig.
Between Groups	57210.319	13	4400.794	10.512	.000
Within Groups	54423.730	130	418.644	/	/
Total	111634.050	143	/	/	/

The Tukey HSD test showed that the subjects playing the piano for one to two months got the lowest mean score. It was significantly lower than for those with one to five years,

seven and eight years. See Table 6.8.1.1.3.

Table 6.8.1.1.3: Tukey HSD Test of AP Achievement of All Subjects Playing Pianos for Different Durations

Duration of Playing Piano		Mean Difference (I-J)	Standard Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1-2 months	3-4 months	-7.7248	8.77249	1.000	-37.7115	22.2620
	5-6 months	-2.2779	7.53854	1.000	-28.0466	23.4909
	7-8 months	-11.8745	9.18871	.990	-43.2841	19.5350
	9-10 months	-2.1140	8.77249	1.000	-32.1008	27.8728
	10-11 months	-14.3299	11.37045	.992	-53.1972	24.5374
	1 year	-32.8687*	5.99507	.000	-53.3615	-12.3760
	2 years	-38.8227*	7.38439	.000	-64.0646	-13.5808
	3 years	-53.8185*	8.77249	.000	-83.8053	-23.8317
	4 years	-43.7333*	7.12681	.000	-68.0947	-19.3719
	5 years	-47.9947*	10.40937	.001	-83.5767	-12.4126
	6 years	-51.9719	15.29536	.053	-104.2557	.311
	7 years	-76.4037*	15.29536	.000	-128.6875	-24.1200
	8 years	-67.5022*	12.81305	.000	-111.3007	-23.7037

* The mean difference is significant at the .05 level.

Subjects of playing the piano for one to eleven months were grouped together. The mean score of the subjects playing the piano less than a year was significantly lower than those for one to eight years (p=.000 & .037). AP started to develop in one to two months of learning the piano. It appeared to develop better as subjects played the piano longer. See Table 6.8.1.1.4.

Table 6.8.1.1.4: Tukey HSD Test of AP Achievement of All Subjects Playing Pianos from Less Than One Year to Eight Years

Duration of Playing Piano		Mean Difference	standard Error	Significance
Less than 1 year	1 year	-28.5045*	4.28935	.000
	2 years	-34.4584*	6.06030	.000
	3 years	-49.4542*	7.67080	.000
	4 years	-39.3690*	5.74818	.000
	5 years	-43.6304*	9.47632	.000
	6 years	-47.6077*	14.61638	.037
	7 years	-72.0395*	14.61638	.000
	8 years	-63.1380*	12.03493	.000

* The mean difference is significant at the .05 level.

6.8.1.2. Sub-Question1.2: Is there any correlation between subjects' time to reveal AP and their post-test scores?

The Spearman's correlation showed that the AP scores of the 122 AP1-10 subjects were positively correlated to the duration of playing the piano (rho=.64, df=120, p=.000, 2-tailed). The effect size, r=.64, was great (Cohen, 1988). The longer the subjects played the piano, the higher would be their AP scores.

6.8.1.3. Sub-Question 1.3: What is the shortest time reported by AP subjects to reveal AP?

From the reports of 122 AP1-10 subjects who noticed their AP within one to two months of the piano learning, ten (8.2%) were AP1-4 and 13 (10.65%) were AP5-10, making a total of 23 (18.85%), with a mean score of 52.22% (SD=27.11). Most of the subjects (N=37, 30.33% in AP1-4 and N=53, 43.43% in AP5-10, with a total N=90, 73.76%, M=53.71, SD=23.89), however, found their AP revealed within six months. See Table 6.8.1.3.1 and 6.8.1.3.2.

Table 6.8.1.3.1: Time AP1-10 Subjects Claimed to Reveal AP

Months to Reveal AP	AP1-4 Subjects(N)	Percent	AP5-10 Subjects(N)	Percent	Total N of Subjects	Total Percent	Cumulative Percent
1-2	10	8.20	13	10.65	23	18.85	18.85
3-4	15	12.29	22	18.03	37	30.32	49.17
5-6	12	9.84	18	14.75	30	24.59	73.76
7-8	12	9.84	3	2.46	15	12.30	86.06
9-10	2	1.64	2	1.64	4	3.28	89.34
11-12	7	5.74	4	3.28	11	9.02	98.36
13-14	0	0.00	2	1.64	2	1.64	100.00
Total	58	47.55	64	52.45	122	100.00	/

Table 6.8.1.3.2: AP Achievement of AP1-10 Subjects of Different Time to Reveal AP

Time to Reveal AP (months)	Number	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1-2	23	52.2233	27.10916	5.65265	40.5004	63.9462	12.50	96.59
3-4	37	55.2518	24.64832	4.05216	47.0337	63.4700	11.36	100.00
5-6	30	52.9545	20.85200	3.80704	45.1683	60.7408	18.18	95.45
7-8	15	31.0986	15.96491	4.12212	22.2575	39.9397	10.23	61.36
9-10	4	49.1477	6.69876	3.34938	38.4885	59.8070	42.05	55.68
11-12	11	44.5764	28.89400	8.71187	25.1652	63.9877	10.23	81.25
13-14	2	59.6591	13.66002	9.65909	-63.0713	182.3895	50.00	69.32
Total	122	50.0559	24.07883	2.18000	45.7400	54.3718	10.23	100.00

The one-way ANOVA found significant differences among the mean AP scores of the subjects with different claimed revealing time (F=2.215, df=6, 115, p=.046). See Table 6.8.1.3.3.

Table 6.8.1.3.3: Unrelated One-Way ANOVA of AP Achievement of AP1-10 Subjects with Different Time Claimed to Reveal AP

AP Achievement	Sum of Square	df	Mean Square	F	Sig.
Between Groups	7267.726	6	1211.288	2.215	.046
Within Groups	22886.888	115	546.843	/	/
Total	70154.050	121	/	/	/

The Tukey HSD test showed that only the mean score of the subjects (N=15) who claimed to reveal AP within seven to eight months was significantly lower than (MD=24.1532, SE=7.15791, p=.017) that of the subjects who claimed to reveal AP within three to four months (N=37, M=55.25, SD=24.65). Other differences were non-significant.

6.8.1.4. Sub-Question 1.4: Is there any correlation between the time reported by subjects to reveal AP and their post-test scores?

The Spearman's correlation showed that the 122 AP1-10 subjects' time reported to reveal AP was negatively correlated to the post-test scores (rho=-.171, df=120, p=.030, 1-tailed). The effect size, r=.17, was small (Cohen, 1988), but the correlation was significant. The shorter the time AP revealed, the higher would be the AP scores.

6.8.1.5. Sub-Question 1.5: What is the shortest time needed for subjects to attain to AP5 or higher?

Table 6.4.7 shows that the subjects playing the piano for two years got a mean AP score of 55.03% (SD=25.13). The subjects playing piano longer than two years obtained mean scores even higher, ranging from 59.94% (SD=22.81) to 92.61% (SD=2.41). Subjects attained the mean of AP8 or AP9 (maximum AP9 or AP10 respectively) after playing the piano for seven to eight years. Subjects attained AP5 in their second year of learning. AP grew as more time was invested.

6.8.1.6. Codetta

AP may be developed in as little as one to two months of piano playing. The longer

subjects played the piano, the higher would be the AP score. These findings were consistent with the subjects' reports that AP revealed as short as one to two months of the piano learning. The shorter the time AP was reported to reveal, the higher would be the post-test scores. They could develop to AP5 or higher in a mean of the second year of playing the piano.

6.8.2. Question 2: What is the piano standard needed for subjects to develop AP under LCK MusET?

6.8.2.1. Sub-Question 2.1: What is the lowest piano standard for subjects to develop AP?

There were 60 (41.7%) subjects in the preparatory grade out of 144 subjects. Twenty-one (35.0%) were AP0, 33 (55%) AP1-4 and six (10%) were AP5-7. The majority (N=39, 65%) had developed AP. The AP subjects higher than this grade had even higher occurrence rates, ranging from 96.2% to 100%. For the AP5-10 group, the prevalence rates of other grades were higher than that of the preparatory grade as well, ranging from 46.2% to 100%. All subjects at grade one or higher had AP except one MR in grade two. In the AP5-10 group, except in grade two (46.2%), over half of the subjects in each grade succeeded to develop AP, ranging from 52.4% to 100%. See Table 6.8.2.1.1.

Table 6.8.2.1.1: Frequency Analysis of All Subjects' Latest Piano Grades

Piano Grade	AP0		Ap1-4		AP5-10		AP1-10		Total
	N	Percent	N	Percent	N	Percent	N	Percent	
Preparatory	21	35.0	33	55.0	6	10.0	39	65.0	60
1	0	0.0	10	47.6	11	52.4	21	100.0	21
2	1	3.8	13	50.0	12	46.2	25	96.2	26
3	0	0.0	1	7.7	12	92.3	13	100.0	13
4	0	0.0	1	14.3	6	85.7	7	100.0	7
5	0	0.0	0	0.0	4	100.0	4	100.0	4
6	0	0.0	0	0.0	2	100.0	2	100.0	2
7	0	0.0	0	0.0	2	100.0	2	100.0	2
8	0	0.0	0	0.0	2	100.0	2	100.0	2
Diploma	0	0.0	0	0.0	7	100.0	7	100.0	7
Total	22	15.3	58	40.3	64	44.4	122	84.7	144

Subjects at the preparatory grade achieved a mean post-test score of 20.46% (SD=18.84), with a maximum score of 79.55%. All other subjects (N=84, 58.3%) with grades higher than this obtained mean scores higher than this, ranging from 45.43% (SD=17.21) at grade two (N=26, 18.1%) to 87.78% (SD=9.24) at grade eight (N=2, 1.4%). The unrelated one-way ANOVA found significant differences among them (F=25.436, df=9, 134, p=.000). Thus, subjects started to possess AP at the preparatory grade. See Table 6.8.2.1.2.

Table 6.8.2.1.2: Unrelated One-way ANOVA of AP Achievement of All Subjects of Different Piano Grades

Descriptives

Grade	N	Mean Scores	Standard Deviation	Standard Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Preparatory	60	20.4640	18.83589	2.43170	15.5982	25.3298	.00	79.55
1	21	48.0249	20.02684	4.37021	38.9088	57.1410	11.93	81.25
2	26	45.4327	17.21017	3.37519	38.4814	52.3840	4.55	76.70
3	13	67.5699	12.81973	3.55555	59.8230	75.3168	46.02	95.45
4	7	70.9416	17.59661	6.65089	54.6674	87.2157	44.32	98.30
5	4	80.1136	2.12594	1.06297	76.7308	83.4965	77.84	82.95
6	2	59.0918	12.05167	8.52182	-49.1881	167.3718	50.57	67.61
7	2	83.5227	18.48120	13.06818	-82.5243	249.5697	70.45	96.59
8	2	87.7841	9.24060	6.53409	4.7606	170.8076	81.25	94.32
Diploma	7	85.4708	8.59726	3.24946	77.5196	93.4219	73.30	100.00
Total	144	42.8622	27.94025	2.32835	38.2598	47.4647	.00	100.00

ANOVA

AP Achievement	Sum of Squares	df	Mean Square	F	Significance
Between Groups	70415.949	9	7823.994	25.436	.000
Within Groups	41218.101	134	307.598	/	/
Total	111634.050	143	/	/	/

The Tukey HSD test showed that subjects of the preparatory grade got the lowest mean score among all. It was significantly lower than those of grade one (MD=-27.56, SD=4.47, p=.000), grade two (MD=-24.97, SD=4.12, p=.000), grade three (MD=47.11, SD=5.37, p=.000), grade four (MD=-50.48, SD=7.01, p=.000), grade five (MD=-59.65, SD=9.06, p=.000), grade seven (MD=-63.06, SD=12.61, p=.000), grade eight (MD=-67.32,

SD=12.61, p=.000) and Diploma (MD=-65.01, SD=7.01, p=.000). See Table 6.8.2.1.3.

Table 6.8.2.1.3: Tukey HSD Test of AP Achievement of All Subjects of Different Piano Grades

Student's Latest Piano Grade		Mean Difference	Standard Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Preparatory	1	-27.5609*	4.4681	.000	-41.8696	-13.2522
	2	-24.9687*	4.11793	.000	-38.2191	-11.7182
	3	-47.1059*	5.36544	.000	-64.3706	-29.8413
	4	-50.4775*	7.00494	.000	-73.0177	-27.9374
	5	-59.6496*	9.05682	.000	-88.7922	-30.5070
	6	-38.6278	12.60657	.076	-79.1926	1.9370
	7	-63.0587*	12.60657	.000	-103.6235	-22.4939
	8	-67.3201*	12.60657	.000	-107.8848	-26.7553
	Diploma	-65.0068*	7.00494	.000	-87.5469	-42.4666

AP started to develop when subjects were at the preparatory grade. Then it grew as they advanced their piano standards.

6.8.2.2. Sub-Question 2.2: Is there any correlation between subjects' piano standard and their post-test scores?

The Spearman's correlation showed the 144 subjects' AP achievement was positively related to their piano grades (rho=.786, df=142, p=.000). The effect size, r=.79, was very strong (Cohen, 1988). The higher the piano grades they attained, the higher scores they obtained in the AP test.

6.8.2.3. Sub-Question 2.3: What is the lowest piano standard needed for subjects to attain to AP5 or higher?

Table 6.8.2.1.2 shows that subjects playing the piano up to grade three got a mean AP score of 67.57% (SD=12.82). The subjects with higher grades got even higher mean scores, ranging from 70.94% (SD=17.60) to 87.78% (SD=9.24) except the one in grade six (M=59.09, SD=12.05). From grade three upwards, subjects were able to attain to AP5 or higher.

6.8.2.4. Codetta

The preparatory grade subjects started to develop AP. As their piano standards moved up,

their AP achievement improved. They could develop to AP5 or higher from grade three upwards.

6.8.3. Question 3: What are AP subjects' AP encoding strategies under LCK MusET?

All subjects were reported by examiners to call out sol-fah names in identifying tones in the post-test, including those writing down letter names on answer sheets. Totally 195 responses of 122 AP1-10 subjects were collected from Item III.6 of the questionnaire. In most situations (N=171, 87.69%), subjects associated tones to sol-fah names (N=105, 53.84%) and identified tones naturally without noticing how (N=66, 33.85%). In some minor situations (N=24, 12.31%), they associated tones to letter names (N=12, 6.15%) and recognized tonal individualities (N=7, 3.59%). Two (1.03%) AP5-10 associated tones to the image of the keyboard. Two (1.03%) AP5-10 referred tones to the image of the stave. One (0.51%) AP1-4 compared tones to many internal standard tones. No AP subjects processed AP with other skills.

Considering only the 64 AP5-10 subjects, there were 110 responses. Sixty-one (55.45%) of the responses associated tones to sol-fah names, 28 (25.45%) identified tones naturally without noticing how, eleven (10%) associated tones to letter names, six (5.46%) recognized tonal individualities, two (1.82%) associated tones to the image of the keyboard and two (1.82%) related tones to the image of the stave. No AP5-10 subjects used other techniques.

Identifying tones naturally without noticing how, in fact, was not a strategy. Subjects were too young to understand how they processed AP. When they heard a tone, they called out sol-fah names. Subjects who recognized tonal qualities or compared tones to standards eventually associated tones to sol-fah names. They used verbal codes. In fact, AP1-10 subjects used verbal encodes in most situations (N=191, 97.95%). In minor situations (N=4, 2.05%), they used pictorial encoding strategies, including relating tones to the images of the keyboard and the stave. In the AP1-4 group, all subjects used the verbal encoding strategy. In the AP5-10 group, 96.36% (N=106) of the situations were verbal and 3.64%

(N=4) were pictorial encodes. See Appendix VII.2, Table 6.8.3.1, p.450.

Fifty-six (96.6%) AP1-4 and 49 (76.5%) AP5-10 used one encoding strategy, i.e. mainly relating tones to sol-fah names. One (1.6%) AP1-4 and 10 (15.7%) AP5-10 used two encoding strategies, involving relating tones to sol-fah names, letter names, tonal qualities and/or internal standards. The main strategy was using the verbal codes of sol-fah and letter names. One (1.6%) AP1-4 and four (6.3%) used three strategies, including referring tones to sol-fah names, letter names, the keyboard and/or the stave. The one AP1-4 and three AP5-10 kept the verbal codes while one AP5-10 employed verbal and pictorial codes. One (1.6%) AP5-10 used four strategies, including referring tones to sol-fah names, letter names, tonal qualities and the keyboard. He used both verbal and pictorial codes. See Appendix VII.2, Table 6.8.3.2 to 6.8.3.5, pp.451-452.

Conclusively, all (N=58, 100%) AP1-4 and 61 (95.31%) AP5-10 used the single strategy of verbal encoding, and three (4.69%) AP5-10 used multiple strategies of verbal and pictorial codes, i.e. relating tones to sol-fah and/or letter names, and the image of the keyboard and/or the stave.

Even though the verbal encoding strategy was the main AP processing strategy, the independent samples t-test showed that the mean post-test score of the three (2.8%) SD subjects (M=17.42, SD=13.23) was lower than (MD=-26.44) that of the 106 normal speech (103 MS and three AT) (97.2%) subjects (M=43.86, SD=27.93) with a non-significant difference (t=-1.629, df=107, p>.05, 2-tailed). See Table 6.8.3.6.

Table 6.8.3.6: Independent Samples T-Test of AP Achievement of Three SD and 106 MS Subjects

Group Statistics

Educational Category		Number	Mean	Std. Deviation	Std. Error Mean
AP Achievement	SD	3	17.4242	13.23185	7.63941
	Normal Speech	106	43.8626	27.92725	2.71253

Independent Samples Test

Variances of AP scores		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Standard Error Difference	95% Confidence Interval of the Difference	
									Lower Bound	Upper Bound
AP Achieve-ment	Equal variances assumed	2.567	.112	-1.629	107	.106	-26.4383	16.23144	-58.61528	5.73860
	Equal variances not assumed	/	/	-3.261	2.535	.060	-26.4383	8.10669	-55.13012	2.25344

The verbal encoding strategy of associating tones to sol-fah names was the main strategy that all subjects used. The SD was not a hindrance in processing the verbal codes. Other minor strategies were relating tones to letter names, tonal qualities, the image of the keyboard and stave. Other strategies, such as referring tones to compositions, colours, scales, throat positions, words and tinnitus were not used. Comparing tones to internal standards was restricted to a new adult AP2 subject.

6.8.4. Question 4: What are AP subjects' identification processes in the note and octave judgment under LCK MusET?

With regard to the order of identifying note and octave designations, the 144 AP1-10 subjects identified notes and octave designations simultaneously for half of the occasions (53.33% in AP1-4 and 50.81% in AP5-10 with a mean of 51.97%). On most of the other occasions (44.76% in AP1-4 and 49.19% in AP5-10 with a mean of 47.16%), they identified note names first and then octave designations. They (2 AP1-4) seldom (0.87%) identified octave names first and then note names. See Table 6.8.4.1.

Table 6.8.4.1: Order of Identifying Note and Octave Names of AP1-10 Subjects

Process	AP1-4			AP5-10			AP1-10	
	N of Choices	Percent	Valid Percent	N of Choices	Percent	Valid Percent	Total N of Choices	Total Percent
Identify notes then octaves	47	20.52	44.76	61	26.64	49.19	108	47.16
Identify octaves then notes	2	0.87	1.91	0	0.00	0.00	2	0.87
Identify notes and octaves simultaneously	56	24.46	53.33	63	27.51	50.81	119	51.97
Total N of Choices	105	45.85	100.00	124	54.15	100.00	229	100.00

Sixty-one (95.3%) AP5-10 subjects reported using both strategies of identifying note

names before octave designations, and identifying note and octave designations simultaneously. Three (4.7%) used the only strategy of identifying note and octave designations simultaneously. Forty-five (77.6%) AP1-4 subjects used both strategies of identifying note name before octave designations, and identifying note and octave designations simultaneously. Nine (15.6%) used one strategy of identifying note and octave designations simultaneously. Two (3.4%) identified note names before octave designations. Two (3.4%) used two strategies of identifying note and octave designations simultaneously, and identifying octaves before note names.

Out of the 122 AP1-10 subjects, those of six years of age or under who identified note and octave names simultaneously (N=78, 64.0%) gained a higher mean post-test score (M=54.54, SD=24.36) than those (N=2, 1.6%) who did not (M=21.59, SD=12.86). But the subjects of seven years old or over who identified notes and octaves simultaneously (N=41, 33.6%) got a lower mean score (M=42.42, SD=21.40) than those (N=1, 0.8%) who did not (M=70.46). The unrelated two-way ANOVA showed that the interaction of the age group and the identification of note and octave names simultaneously on the AP achievement was significant (F=.449, df=1,118, p=.037). Those of six years of age or younger (N=78, 65.5% of 119 subjects) identifying note and octave names simultaneously (M=54.54, SD=24.36) attained significantly higher mean post-test scores than those of seven years of age or older (N=41, 34.5%) did (M=42.42, SD=21.40). See Table 6.8.4.2.

Table 6.8.4.2: Unrelated Two-way ANOVA of AP Achievement of AP1-10 Subjects by Age Group of Commencing Piano Playing and Identifying Note and Octave Names Simultaneously

Age of Commencing Piano Playing	Identifying Note and Octave Names Simultaneously	Mean	Standard Deviation	Number
2-6 Years of Age	yes	54.5382	24.35569	78
	no	21.5909	12.85649	2
	Total	53.7145	24.63876	80
7-23 Years of Age	yes	42.4197	21.40006	41
	No	70.4545	./	1
	Total	43.0872	21.57558	42
Total	yes	50.3629	23.99532	119
	no	37.8788	29.64000	3
	Total	50.0559	24.07883	122

Test Between-Subjects Effects

Dependent Variable: AP Achievement scores

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	5994.466[a]	3	1998.155	3.675	.014	.085
Intercept	23238.354	1	23238.354	42.739	.000	.266
Age Group	878.349	1	878.349	1.615	.206	.014
Identifying Tones Simultaneously	15.698	1	15.698	.029	.865	.000
Age Group x Identifying Tones Simultaneously	2419.198	1	2419.198	4.449	.037	.036
Error	64160.148	118	543.730	/	/	/
Total	375836.996	122	/	/	/	/
Corrected Total	70154.615	121	/	/	/	/

6.8.5. Question 5: What are AP subjects' degrees of accuracy in piano tone identification under LCK MusET?

6.8.5.1. Question 5.1: What is the accuracy in the right note judgment without octave errors?

With regard to the right note judgment without octave errors of 64 AP5-10 subjects, middle C was the note which most subjects (95.31%) could identify. C_o, F_o, E_o, C^1, G_o and D_o are the notes in order in which more than 90% of subjects could identify. They were white notes mainly in the middle register. $C\#_3$ was the note which the fewest subjects (15.63%) could identify. $C\#_3$, Eb_3, B_4, Bb_4, Ab_3, and $F\#_3$ are the notes in order in which less than 30% of the subject could identify. These were black key notes in the lowest and the second lowest registers. Refer to Appendix VII.3, Table 6.8.5.1.1, pp.453.

6.8.5.2. Sub-Question 5.2: What is the accuracy in the right note judgment ignoring octave errors?

Concerning the right note judgment ignoring octave errors, all the AP5-10 subjects could identify Co, C^1 and E_o. More than 90% of them could recognize in order C_o, C^1, E_o, G_o, G_1, D_1, C_1, E^1, A_1, C^3, F_o, C^2, C_2, A_2, A^1, G^1, D_o, E^2, D_2, G_2, F^1, B_o, D_2, A_o, F^2, D^1, F_1, $F\#_1$, F_2, B^1, D^3, G^2 and C^4. These were mainly white keys within C_2-C^2. $C\#_3$ was the note which the fewest subjects (17.19%) could identify. Less than 30% of the subjects could recognize the

order C#$_3$, B$_4$, Eb$_3$ and Bb$_4$. These were mainly black keys in the lowest and the second lowest registers. Refer to Appendix VII.3, Table 6.8.5.2.1, p.454.

6.8.5.3. Sub-Question 5.3: What is the accuracy in the right note judgment without octave designations?

Of the 12 notes, the most familiar to the least were in order: C, G, A, D, B, F, E, Bb, F#, Eb, Ab and C#. A$_4$ to C$_3$ were excluded in the counting of frequencies since they were particularly low and hard to be in tune. The notes from D$_3$ to C^4 made up in total seven octaves. C was the most familiar note. Subjects identified the white key notes (86.38% to 97.32%) far better than the black key notes (60.49% to 74.11%). They formed two distinctive groups of notes. Refer to Appendix VII.3, Table 6.8.5.3.1, pp.455.

6.8.6. Question 6: What are AP subjects' degrees of accuracy in identifying piano white and black key tones under LCK MusET?

From the 64 AP5-10 subjects, there were totally 3328 white key note judgments, 411 (12.35%) being wrong note and 2917 (87.65%) accurate note responses. From 2304 black key note judgments, there were 800 (34.72%) wrong note and 1504 (65.28%) accurate note answers. The white key notes were 22.37% more accurately judged than the black key notes. See Table.6.8.6.1.

Table 6.8.6.1: Tonal Judgment in White and Black Keys of AP5-10 Subjects

Notes		White Keys	Black Keys	Totals
Answers	Wrong (N)	411	800	1211
	Percent	7.30	14.21	21.51
	Valid Percent	12.35	34.72	/
	Right Note Wrong Octave (N)	621	364	985
	Percent	11.03	6.46	17.49
	Valid Percent	18.66	15.80	/
	Right Note Right Octave (N)	2296	1140	3436
	Percent	40.76	20.24	61.00
	Valid Percent	68.99	49.48	/
	Total (N)	3328	2304	5632
	Total Percent	59.09	40.91	100.00

The paired samples t-test found that the AP5-10 subjects' mean score of the white key

notes (M=78.32, SD=11.17) was significantly higher (t=10.776, df=63, p=.000, 2-tailed) than that of the black key notes (M=57.38, SD=20.70), with a mean difference of 20.94%. Subjects identified the white key notes significantly better than the black key notes. See Table 6.8.6.2.

Table 6.8.6.2: Paired Samples T-Test of White and Black Key Tone Judgments of AP5-10 Subjects

Paired Samples Statistics

Score	Mean	N	Std. Deviation	Std. Error Mean
White Key Tone score	78.3203	64	11.17132	1.39641
Black Key Tone score	57.3785	64	20.70415	2.58802

Paired Samples Test

Scores	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Standard Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower Bound	Upper Bound			
White key score - Black key score	20.9418	15.54754	1.94344	17.0582	24.8255	10.776	63	.000

6.8.7. Question 7: What are AP subjects' degrees of accuracy in identifying different piano registers under LCK MusET?

From the tonal judgment of 64 AP5-10 subjects in C_3-B_3, C_2-B_2, C_1-B_1, C_o-B_o, C^1-B^1, C^2-B^2 and C^3-B^3, the middle region (C_o-B_o) was the most easily recognized octave (M=83.14, SD=14.29). The next easily identified regions were the ones next to C_o-B_o, i.e. C_1-B_1 (M=79.10, SD=13.80) and C^1-B^1 (M=78.19, SD=14.97). The third easily identified regions were C_2-B_2 (M=73.18, SD=18.35) and C^2-B^2 (M=71.09, SD=18.68). The regions hardest to identify were the two extremes, i.e. C^3-B^3 (M=65.63, SD=19.80) and C_3-B_3 (M=45.38, SD=21.07). The order of octaves from the most familiar to the least was C_o-B_o, C_1-B_1, C^1-B^1, C_2-B_2, C^2-B^2, C^3-B^3 and C_3-B_3. See Tables 6.8.7.1 and 6.8.7.2.

Table 6.8.7.1: Tonal Judgment in Different Registers of AP5-10 Subjects

Register		C_3-B_3	C_2-B_2	C_1-B_1	C_o-B_o	C^1-B^1	C^2-B^2	C^3-B^3	Total
Answers	Wrong (N)	369	131	86	81	87	135	200	1211
	Percent	6.55	2.32	1.53	1.44	1.54	2.40	3.55	21.50
	Valid Percent	48.05	17.06	11.20	10.55	11.33	17.58	26.04	/
	Right Note Wrong Octave (N)	101	150	149	97	161	174	128	985
	Percent	1.79	2.67	2.65	1.72	2.86	3.09	2.27	17.49
	Valid Percent	13.15	19.53	19.40	12.63	20.96	22.66	16.67	/
	Right Note Right Octave (N)	298	487	533	590	520	459	440	3436
	Percent	5.29	8.65	9.46	10.48	9.23	8.15	7.81	61.01
	Valid Percent	38.80	63.41	69.40	76.82	67.71	59.76	57.29	/
	Total (N)	768	768	768	768	768	768	768	5632
	Total Percent	13.64	13.64	13.64	13.64	13.64	13.64	13.64	100

Table 6.8.7.2: Score of Tonal Judgment in Different Registers of AP5-10 Subjects

Order	Registers	Scores				
		Full	Right Note Wrong Octaves	Right Notes	Total	Percent
1	C_o-B_o	1,536	97	1180	1277	83.14
2	C_1-B_1	1,536	149	1066	1215	79.10
3	C^1-B^1	1,536	161	1040	1201	78.19
4	C_2-B_2	1,536	150	974	1124	73.18
5	C^2-B^2	1,536	174	918	1092	71.09
6	C^3-B^3	1,536	128	880	1008	65.63
7	C_3-B_3	1,536	101	596	697	45.38
Total		11,264	985	6872	7857	69.75

The paired samples t-test found that: a) the mean score of C_o-B_o was significantly higher (MD=4.04) than that of C_1-B_1 (t=2.89, df=63, p=.005, 2-tailed); b) the mean score of C_1-B_1 was higher (MD=0.91) than that of C^1-B^1 with a non-significant difference (t=.665, df=63, p=.509, 2-tailed); c) the mean score of C^1-B^1 was significantly higher (MD=5.01) than that of C_2-B_2 (t=2.819, df=63, p=.006, 2-tailed); d) the mean score of C_2-B_2 was higher (MD=2.08) than that of C^2-B^2, but the difference was non-significant (t=1.22, df=63, p=.227, 2-tailed); e) the mean score of C^2-B^2 was significantly higher (MD=5.47) than that of C^3-B^3 (t=2.649, df=63, p=.010, 2-tailed); and f) the mean score of C^3-B^3 was significantly higher (MD=20.25) than that of C_3-B_3 (t=9.164, df=63, p=.000, 2-tailed). The

order of familiarity was C_o-B_o, C_1-B_1, C^1-B^1, C_2-B_2, C^2-B^2, C^3-B^3 and C_3-B_3 even though the differences between C_1-B_1 and C^1-B^1, and between C_2-B_2 and C^2-B^2 were not significant. See Table 6.8.7.3.

Table 6.8.7.3: Paired Samples T-Test of Scores of Different Registers of AP5-10 Subjects

Paired Samples Statistics

Registers		Mean	Number	Std. Deviation	Std. Error Mean
Pair 1	C_o-B_o	83.1380	64	14.28849	1.78606
	C_1-B_1	79.1016	64	13.79916	1.72489
Pair 2	C^1-B^1	78.1901	64	14.97246	1.87156
	C_1-B_1	79.1016	64	13.79916	1.72489
Pair 3	C^1-B^1	78.1901	64	14.97246	1.87156
	C_2-B_2	73.1771	64	18.34888	2.29361
Pair 4	C^2-B^2	71.0937	64	18.67637	2.33455
	C_2-B_2	73.1771	64	18.34888	2.29361
Pair 5	C^3-B^3	65.6250	64	19.79558	2.47445
	C^2-B^2	71.0937	64	18.67637	2.33455
Pair 6	C^3-B^3	65.6250	64	19.79558	2.47445
	C_3-B_3	45.3776	64	21.06508	2.63313

Paired Samples Test

Registers		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Standard Deviation	Standard Error Mean	95 % Confidence Interval of the Difference				
					Lower Bound	Upper Bound			
Pair 1	C_o-B_o C_1-B_1	4.0365	11.18450	1.39806	1.2427	6.8303	2.887	63	.005
Pair 2	C^1-B^1 C_1-B_1	-.9115	10.97307	1.37163	-3.6524	1.8295	-.665	63	.509
Pair 3	C^1-B^1 C_2-B_2	5.0130	14.22567	1.77821	1.4596	8.5665	2.819	63	.006
Pair 4	C^2-B^2 C_2-B_2	-2.0833	13.64872	1.70609	-5.4927	1.3560	-1.221	63	.227
Pair 5	C^3-B^3 C^2-B^2	-5.4688	16.51510	2.06439	-9.5941	-1.3434	-2.649	63	.010
Pair 6	C^3-B^3 C_3-B_3	20.2474	17.67560	2.20945	15.8322	24.6626	9.164	63	.000

6.8.8. Question 8: What are AP subjects' degrees of accuracy in identifying two extreme piano octaves under LCK MusET?

Sixty-four AP5-10 subjects got the highest scores (76.25%) in the registers other than the two extreme octaves (Bb_3-B^2) which was 54.27%. They were 21.98% higher than that of the two extreme octaves (A_4-A_3 and C^3-C^4). Subjects identified the upper extreme octave (66.83%) better than the lower extreme (41.71%), with a difference of 25.12%. Both extremes had scores lower than that of the other registers respectively, with a difference of 9.42% between the high extreme and 34.54% between the low extreme and the other registers. See Table 6.8.8.1 and 6.8.8.2.

Table 6.8.8.1: Tonal Judgment in the Highest, Lowest and Rest of Registers of AP5-10 Subjects

Registers		A_4-A_3	C^3-C^4	Others(Bb_3-B^2)	Total
Answers	Wrong (N)	443	206	562	1211
	Percent	7.86	3.66	9.98	21.50
	Valid Percent	53.24	24.76	14.16	/
	Right Note Wrong Octave (N)	84	140	761	985
	Percent	1.49	2.48	13.52	17.49
	Valid Percent	10.10	16.83	19.18	/
	Right Note Right Octave (N)	305	486	2645	3436
	Percent	5.42	8.63	46.96	61.01
	Valid Percent	36.66	58.41	66.66	/
	Total (N)	832	832	3968	5632
	Total Percent	14.77	14.77	70.46	100

Table 6.8.8.2: Score of Tonal Judgment of AP5-10 Subjects in the Highest, Lowest and Rest of Registers

Registers	Scores				
	Full (N)	Right Note Wrong Octave (N)	Right Note Right Octave (N)	Total (N)	Percent
A_4-A_3	1664	84	610	694	41.71
C^3-C^4	1664	140	972	1112	66.83
A_4-A_3/C^3-C^4	3328	224	1582	1806	54.27
Other Registers	7936	761	5290	6051	76.25

The paired samples t-test was used further to analyze the mean scores of the two extreme octaves (i.e. A_4-A_3 and C^3-C^4) and the rest of the piano registers (Bb_3-B^2). The mean of the other registers (M=76.25, SD=13.97) was higher (MD=21.98) than that of the two extreme

octaves (M=54.27, SD=17.64). The difference was significant (t=-12.896, df=63, p=.000, 2-tailed). The lowest and the highest registers were more difficult to identify than the rest of the regions. See Table 6.8.8.3.

Table 6.8.8.3: Paired Samples T-Test of AP5-10 Subjects in Judging Tones in Two Extreme Octaves and Rest of Piano Registers

Paired Samples Statistics

Register	Mean	N	Std. Deviation	Std. Error Mean
A_4-A_3/C^3-C^4	54.2668	64	17.64350	2.20544
B#$_3$-B^2	76.2475	64	13.96514	1.74564

Paired Samples Test

Registers	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Standard Deviation	Std. Error Mean	95 % Confidence Interval of the Difference				
				Lower Bound	Upper Bound			
A^4-A^3/C^3-C^4 B#$_3$-B^2	-21.9807	13.63584	1.70448	-25.3868	-18.5745	-12.896	63	.000

Concerning the two extreme octaves (A_4-A_3 and C^3-C^4), the paired samples t-test showed that the mean score of A_4-A_3 (M=41.71, SD=20.66) was lower than that of C^3-C^4 (M=66.83, SD=19.13). The difference was significant (t=-10.884, df=63, p=.000, 2-tailed). The lowest register was harder to judge than the highest one. See Table 6.8.8.4.

Table 6.8.8.4: Paired Samples T-Test of AP5-10 Subjects in Judging Tones of Two Extreme Octaves

Paired Samples Statistics

Registers	Mean	Number	Std. Deviation	Std. Error Mean
A_4-A_3	41.7067	64	20.66358	2.58295
C^3-C^4	66.8269	64	19.13284	2.39160

Paired Samples Test

Registers	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Standard Deviation	Standard Error Mean	95% Confidence Interval of the Difference				
				Lower Bound	Upper Bound			
A_4-A_3 C^3-C^4	-25.1202	18.46419	2.30802	-29.7324	-20.5080	-10.884	63	.000

6.8.9. Question 9: What are AP subjects' degrees of accuracy in identifying octave designations of piano tones under LCK MusET?

Out of 64 AP5-10 subjects, five subjects (7.8%) made no octave errors. Others (N=59, 92.2%) had one to 47 octave errors. There were 985 (17.49%) right tonal judgments with octave errors from 5632 identifications, with a mean of 15.39 errors (SD=9.87). See Appendix VII.4, Table 6.8.9.1, p.456. One subject had right tone and octave name judgements. Others (N=63, 98.44%) had 24 to 86 right tone and octave name judgements. They had 3,436 (61%) right tone and octave name judgments totally, with a mean of 53.68 right identifications (SD=15.46). Refer to Appendix VII.4, Table 6.8.9.2, p.457. There were 1,211 (21.51%) wrong answers. The judgment with 17.49% octave errors, compared to 61% of the right tone and octave judgment, was considered small in percentage (with a difference of 43.51%). Since subjects' octave answers were checked only when note names were right, the total number of valid answers should be 4,421 (i.e. 3436+985). Thus the percentage of wrong octave answers (N=1211) should be 21.51%. This was regarded as small (with a difference of 56.98%) compared to the 78.49% of the right tone and octave answers (N=3,436).

Of 58 AP1-4, there were totally 5104 identifications. There were 733 (14.36%, M=12.64, SD=6.43) tonal judgments with octave errors and 1,093 (21.42%, M=18.85, SD=9.47) accurate tonal and octave judgments. See Appendix VII.4, Table 6.8.9.3 and 6.8.9.4, pp.458-459. The octave errors were 7.06% less than the right tonal and octave judgments. This difference was smaller than the difference of AP5-10 (43.51%). AP1-4 subjects had 36.45% more octave errors than AP5-10. Since the subjects' octave errors were checked only when note names were right, the total number of valid answers should be 1,826 (i.e. 1,093+733). Thus the percentage of wrong octave answers (N=733) was 40.14% and that of right tonal and octave answers (N=1093) was 59.86%. This difference of 19.72% was smaller than that of the AP5-10 subjects (56.98%). The AP1-4 subjects had 37.26% more octave errors than the AP5-10 subjects.

6.9. Question 10: Why do some subjects fail to develop AP under LCK MusET?

There were 22 AP0, occupying 15.28% of the sample. There were seven reasons why they failed to develop AP to AP1 or higher at the time of the assessment. Fourteen were new students. They studied there for one to six months. Twenty-one were in the preparatory grade. One was the SD, one was the EBD, one was the LD, one was the autistic and one had the piano out of tune. Two used the electronic piano to practise. Three did not follow the LCK MusET method to sing or think of tones in piano practice. Four had only little interest in playing the piano. Sixteen subjects practised the piano less than three hours per week. Four claimed that they failed to associate tones to sol-fah names. They scored 0% to 9.09% in the AP post-test. Ten subjects claimed to use the AP strategy in the AP test. They were reported by examiners as giving responses in the AP test which were certain, immediate and using AP. They had scores ranging from 2.27% to 9.09%.

One MS subject number (No.) 10 had studied the piano for one year. He was in the preparatory grade. He practised the piano less than three hours per week. He did not sing tones in practising piano and failed to associate tones to sol-fah names. He scored 1.14% in the AP test. Another subject No.11 who studied the piano for two years was still in the preparatory grade. He had LD. He had little interest in playing the piano. He scored 3.41% in the AP test. Another autistic subject No.17 who had studied the piano for four years achieved to grade two. He got 4.55% in the AP test. It was remarked by the examiner that he was very inattentive and had emotional problems during the post-test. Four subjects scored zero in the post-test. Two (Nos. 14 and 16) were new students studying for one month. One (No.13) played with the piano out-of-tune. Another one (No.21) practised using an electronic piano.

In summary, the main reasons for subjects failing to develop AP to AP1 or higher were: a) they were new students, studying at MusH for one to six months (N=15, 68.1%); b) they were in the preparatory grade (N=21, 95.5%); c) they played the electronic piano, hindering them from developing absolute piano tone (N=2, 9.1%); d) they played the

out-of-tuned piano (N=2, 9.1%); e) they did not follow the LCK MusET method to sing or think of tones (N=4, 18.2%); f) they had no or little interest in playing the piano (N=15, 68.2%); g) they practised the piano less than three hours per week (N=17, 77.3%); i) they were two to three years old, and had short attention spans and unstable learning emotions (N=10, 45.5%); h) they had attention problems due to the LD and/or unstable emotions (N=9, 40.9%); or j) they had a combination of these factors (N=21, 95.5%). They might need much more time to achieve to AP1 or higher. One autistic subject, playing the piano for two years and attaining grade two, failed to achieve AP1 or higher. He was reported to exhibit unstable emotions during the post-test. See Table 6.9.1, p.211.

Table 6.9.1: Factors Determining AP0

Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Age	4	3*		4	6	2*	3*		5	8	4	2*	7	2*	6	2*	15	9	3*	14	5	3*
Educational Category	MS				SD	MS		EBD	LD	MS	LD	MS			Autistic	MS	Autistic	MS		Mild MR	MS	
Age Commencing Piano Playing	3			4	5	2	3		4	6	2		6	2	5	2	11	9	3	14	5	3
Durations of Playing Piano (month/year)	1-2m*	7-8m	3-4m*	5-6m*	3-4m*	1-2m*	5-6 months*		7-8m	1yr	2yrs	1-2m*	9-10m	1-2 months*			4yrs	1-2m*	7-8m	3-4m*	5-6m*	1-2m*
Piano Grade at Admittance	Grade 0																					
Latest Piano Grades	Preparatory Grade*																Gd.2	Preparatory Grade				
Instrument to Practise	Electronic Piano*	piano																			Electronic Piano*	piano
Piano In-tune or Not	/	yes											no*	yes						no*	/	yes
Interest in Playing Piano	great	no*	great	no*	great	no*					little*	no*	little*		great	little*	great	little*			great	no*
Practise Piano (hours per week)	<3*								3-4	<3*	3-4	<3*					5-6	<3*		3-4	3-4	<3*
Sing Tones in Piano Practice	yes	no*	yes				no*	yes		no*	yes								no*	yes		
Sing Tones in Practising Piano	AP	/	AP				/	AP		/	AP		/	AP					/	AP		
Attention Problem	no				yes*	no		yes*			no			yes*			no			yes*	no	
Pitch Strategy Reported by Subjects	AP											not sure		AP	not sure	AP					not sure	AP
Answer with Certainty	yes												/	yes	/	no			yes	no	/	yes
Answer Immediately	yes												/	yes	/	yes	No	yes	No	/	yes
Pitch Strategy Observed by Examiners	AP							not sure	AP	not sure	AP	not sure					AP	not sure	AP	not sure		AP
AP Score	9.09	5.68	7.95	8.52	2.27	2.27	2.27	2.27	3.41	1.14	3.41	1.14	0		2.27	0	4.55	1.14	3.96	1.14	0	2.84

Key: * indicates a determining factor.

6.10. Question 11: What is the value of AP in music under LCK MusET?

6.10.1. Sub-Question 11.1: How well do AP subjects report AP to help them in learning music, including identifying tones, playing the piano, playing the piano from memory, sight-playing, singing, sight-singing, listening to music, composing, conducting and learning music theory?

From 122 AP1-10 subjects, all (N=121, 99.2%) except one (0.8%) thought AP helpful in learning music. All participants indicated that they thought AP was helpful in identifying notes (N=119, 100%), playing the piano (N=120, 100%), playing the piano from memory (N=94, 100%), sight-playing (N=66, 100%), singing (N=112, 100%), music listening (N=107, 100%) and conducting (N=23, 100%). Most participants reported AP as being helpful in sight-singing (N=74, 98.7%), learning music theory (N=69, 98.6%) and composing (N=27, 90%).

In identifying notes, all participants reported AP as being helpful in identifying tones absolutely. In playing the piano, 94.7% to 100% of participants thought that AP helped them to identify notes accurately and fast, correct wrong notes and learn piano pieces fast. In playing the piano from memory, 98.8% to 100% indicated that they thought that AP helped them to memorize scores accurately and quickly, and discriminate wrong notes. In sight-playing, 90% to 100% reported that AP helped them to discriminate notes and harmonic progressions correctly and fast. In singing, 95.9% to 100% claimed that AP helped them to know melodies easily, memorize scores correctly and quickly, and follow accompaniments easily. In sight-singing, 98.6% to 100% agreed to that AP helped them to identify, sing and memorize notes accurately. In music listening, 95.1% to 100% thought that AP helped them to identify tones, harmonic progressions and keys accurately. And 79.2% indicated that AP helped them to play back music after hearing. In composition, 90% to 100% reported that they were able to sing, write and memorize notes correctly. In conducting, all claimed that AP helped them to identify tones, tones of different parts, and memorize scores accurately. In learning music theory, 95.7% to 100% thought that AP

helped them to identify and memorize notes, chords and scales accurately. Another three subjects claimed that AP enhanced attention. See Appendix VII.5, Table 6.10.1.1, p.460.

6.10.2. Sub-Question 11.2: How well do AP subjects achieve a fast progress in learning the piano?

Grade three subjects (N=13, 10.7%), who attained a mean post-test score of 67.57% (SD=12.82), and who started to play the piano at a mean of the preparatory grade (M=0.62), took a mean of two years (M=2.39, SD=1.50) to progress to this grade (practising with a mean of five to six hours a week, totaling 520 to 624 hours) and passed the ABRSM grade three piano examination. Grade five subjects (N=4, 3.3%), who attained a mean post-test score of 80.11% (SD=2.13), and who started to play the piano at a mean of the preparatory grade (M=0.50), took a mean of three years (M=3.25, SD=0.50) to achieve to this grade (practising with a mean of five to six hours a week, totaling 780 to 936 hours) and passed the ABRSM grade five piano examination. Grade eight subjects (N=2, 1.6%), who attained a mean post-test score of 87.78% (SD=9.24), and who started to play the piano at the preparatory grade (M=0.00), took a mean of five years (M=5.50, SD=2.12) to advance to this grade (practising with a mean of three to four hours a week, totaling 780 to 1040 hours) and passed the ABRSM or TCL grade eight piano examination. Diploma subjects (N=7, 5.7%), who attained a mean post-test score of 85.47% (SD=8.60), and who started to play the piano at a mean of the preparatory grade (M=0.29), took a mean of five years (M=5.86, SD=2.12) to attain to this grade (practising with a mean of five to six hours a week, totaling 1,300 to 1,560 hours) and passed either the DipABRSM (N=2), ATCL (N=1), or the ABRSM or TCL grade eight piano examination (N=4) preparing for the DipABRSM or ATCL. All those subjects possessed AP, with mean scores ranging from 67.57% to 87.78%. See Appendix VII.6, Table 6.10.2.1, p.461-462.

6.10.3. Sub-Question 11.3: How well do AP subjects achieve good memory in playing the piano?

From the reports of 122 AP1-AP10 subjects, 107 (87.7%) subjects indicated that they had

experiences of playing the piano from memory. Out of the 107 subjects, 71(66.4%) could play the piano from memory immediately after they had practised well with sight and 36 (33.6%) could not. For those (N=36) who could not play from memory immediately, 20 (55.6%) practised less than six times to memorize a piece of music. Out of the 107 subjects, 83 (68%) could play one to three pages in the first or first few attempts from memory. See Table 6.10.3.1.

Table 6.10.3.1: Frequency of AP1-10 Subjects Playing Piano from Memory

Variables	Frequency	Percent	Valid Percent	Cumulative Percent	
				Percent	Valid Percent
Play Piano from Memory?	Number of Subjects				
Yes	107	87.7	87.7	87.7	87.7
No	15	12.3	12.3	100.0	100.0
Total	122	100.0	100.0	/	/
Play from Memory Immediately?					
Yes	71	58.2	66.4	58.2	66.4
No	36	29.5	33.6	87.7	100.0
Total	107	87.7	100.0	/	/
How many Times to Memorize?					
0		58.2	66.4	58.2	66.4
1-2	2	1.6	1.9	59.9	68.3
3-4	7	5.7	6.5	65.6	74.8
5-6	11	9.0	10.3	74.6	85.1
7-8	7	5.7	6.5	80.3	91.6
9-15	9	7.4	8.4	87.7	100.0
Total	107	87.5	100.0	/	/
How many Pages to Memorize?					
1-3	83	68.0	77.6	68.0	77.6
4-6	8	6.6	7.5	74.6	85.0
7-9	10	8.2	9.3	82.8	94.4
10-12	2	1.6	1.9	84.4	96.3
13-15	4	3.3	3.7	87.7	100.0
Total	107	87.7	100.0	/	/

Subjects of grade seven or under could memorize as much as seven to nine pages (one grade five subject could memorize 10 to 12 pages) with less than 15 attempts. The long pieces of music were the piano sonatinas by Mozart, Beethoven, Clementi, Diabelli, Gurlitt, Kuhlau or Dussek. The nine grade eight and diploma subjects could play from memory as much as 14 pages under the observation of the researchers. After they had practised the music well, they could either play it immediately or in three to 10 attempts. They did not know beforehand that they would be asked to play the music from memory. The pieces

were difficult and long. See Table 6.10.3.2.

Table 6.10.3.2: Piano Pieces Played from Memory by Grade 8 and Diploma AP Subjects

AP Subject	Piano Grade	Piano Piece	Bars	Pages	Practising Times to memorize
AP10	Diploma	Schubert: Sonata in A, D.664, op.12	424	14	7-8
AP9	Grade 8	Chopin: Nocturne, Op.9, No.1	85	4	7-8
AP9	Diploma	Haydn: Sonata in G, Hob.XIVL / G.1, L.4	174	4	3-4
AP8	Diploma	Beethoven: Sonata in F, Op.54	342	12	0
AP8	Diploma	Mozart: Sonata in G, K283 / 189h	436	14	0
AP8	Diploma	Chopin: Prelude, Op.28, No.15	89	4	5-6
AP8	Diploma	Handel: Prelude & Allegro in A minor	60	4	10
AP8	Grade 8				7-8
AP7	Diploma				0

From 122 AP1-10 subjects, 107 (87.7%) had experiences in playing the piano from memory in the piano syllabus (refer to Appendix I.1, pp. 288-293), ranging from one line or one page in the preparatory grade to 15 pages in the diploma. The Chi-square test showed that the higher the subjects' piano grades, the more pages of music they could play from memory (x^2=137.55, df=36, p=.000, 2-sided). See Table 6.10.3.3.

Table 6.10.3.3: Chi-Square Tests Showing the Relationships of Piano Grades and Pages to Play from Memory by AP1-10 Subjects

Crosstabs

Piano Grade	N of Subjects Versus N of Pages Played from Memory					Mean (Pages)	Total N of Subjects
	1-3 Pages	4-6 Pages	7-9 Pages	10-12 Pages	13-15 Pages		
Preparatory	26	0	0	0	0	1-3	26
1	20	0	0	0	0	1-3	20
2	21	3	0	0	0	1-3	24
3	8	2	3	0	0	1-3	13
4	5	0	2	0	0	1-3	7
5	1	1	1	1	0	4-6	4
6	2	0	0	0	0	1-3	2
7	0	1	1	0	0	4-6	2
8	0	0	2	0	0	7-9	2
Diploma	0	1	1	1	4	10-12	7
Total	83	8	10	2	4	/	107

Chi-Square Tests

Statistics	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	137.550[a]	36	.000
Likelihood Ratio	92.743	36	.000
Linear-by Linear Association	61.898	1	.000
Number of Valid Cases	107	/	/

a. 44 cells (88.0%) have expected count less than 5. The minimum expected count is .04.

Subjects needed more time to practise memorizing music as the piano grades went up (x^2=70.53, df=45, p=.009, 2-sided). The subjects of grade five or under used a mean of 0.5 to two times to memorize a piece of music of 12 pages or under, up to a mean of three to eight times to memorize a piece of 15 pages or under by grade six to diploma AP subjects. See Table 6.10.1.1 and 6.10.3.4.

Table 6.10.3.4: Chi-Square Tests Showing the Relationships of Piano Grades and Pages to Play from Memory by AP1-10 Subjects

Crosstabs

Piano Grade	Number of Subjects in Attempts Played from Memory						Mean (Times)	Total N of Subjects
	0 time	1-2 times	3-4 times	5-6 times	7-8 times	9-15 times		
Preparatory	15	0	0	6	3	2	1-2	26
1	16	1	1	0	0	2	0.65	20
2	17	1	4	1	0	1	0.71	24
3	9	0	0	3	1	0	1-2	13
4	6	0	0	0	0	1	0.71	7
5	3	0	1	0	0	0	0.5	4
6	1	0	0	0	0	1	3-4	2
7	1	0	0	0	0	1	3-4	2
8	0	0	0	0	2	0	7-8	2
Diploma	3	0	1	1	1	1	3-4	7
Total	71	2	7	11	7	9	1-2	107

Chi-Square Tests

Statistics	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	70.527 [a]	45	.009
Likelihood Ratio	57.365	45	.102
Linear-by Linear Association	2.657	1	.103
N of Valid Cases	107	/	/

a. 56 cells (93.3.0%) have expected count less than 5. The minimum expected count is .04.

6.10.4. Sub-Question 11.4: What is subjects' attitude to AP?

All (N=144) subjects agreed to that AP should continue to be taught and practiced at MusH under LCK MusET.