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The Effects of Gesture and Movement Training on the Intonation and Tone Quality of Children's Choral Singing

by

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THESIS CONTAINS

VIDEO   CD

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ABSTRACT

The main purpose of this study was to examine the effects of gesture and movement training for beginner children's choirs with regard to improving intonation and tone quality. A further aim was to determine whether movement training enhances gesture quality. This study also intended to explore the relationship between voice and gesture. Additionally, a series of teaching tools to train children with 'effective' gestures and movements was developed. Fifty-three fifth grade students participated in the empirical investigations. They were randomly assigned into three groups: (1) Group 1— students who received no gesture and movement training; (2) Group 2— students who received gesture training, and (3) Group 3— students who received gesture and movement training. The instructional unit, consisting of two 40-minute sessions per week for 24 sessions, focused on vocal development. Each individual was pretested and posttested, and the three groups were pretested, mid-tested, and posttested. Three different groups each comprising of three experts were asked to judge both the children's individual and group performances in singing and gesture. Statistical analyses showed that the children who received gesture and/or movement training significantly performed better than those who did not both in 'Intonation' and 'Tone Quality'. Children who received movement training gained a significantly higher score on gesture quality. The results also showed that the relationship between voice and gesture was significantly correlated. In addition, the students sang significantly better with gesture. It was concluded that gesture training has a positive effect on improving children's intonation and tone quality. Furthermore, the combination of gesture and movement training could be a powerful teaching strategy in choral rehearsals.

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CHAPTER 1

INTRODUCTION

Background

Western choral singing was first introduced into Taiwan by the Dutch in the seventeenth century. The growth of choral music subsequently was taken on a step by the English and Canadian Presbyterian missionaries who were responsible for developing and encouraging church choral activities during the nineteenth century (Weng, 1995). Choral singing has developed gradually over time. For example, Hwen-Jue, a well-renowned composer of choral music in China, wrote a large quantity of choral music works after returning from Germany and the USA. Since the Chinese Choral Society was established in 1969, choral music has become very popular and the number of singers has increased in Taiwan. Choral singing is an important activity in primary schools, with almost every primary school having its own choir and classroom choirs. Outside school, professional and community children's choirs have developed rapidly in the last decade. Primary school music teachers are responsible for training school choirs. Most of them graduate from music education department of teacher colleges, whilst the majority of professional choirs are normally conducted by professional conductors who are highly qualified and have much experience of choral conducting.

Many music educators have called for the need to improve music teacher education programmes in Taiwan (e.g. Chiang, 1998; Lee, 1998). Lee (1998) criticised the distance between theory and practice in music teachers' training in teacher colleges; in particular, a lack of information and training in effective methods. The majority of choral music teachers/conductors teach choral singing based on their own choral experiences or from having had private voice lessons. Emerging out of the teacher's

own adult experiences in one to one voice lessons, what might be regarded as a 'traditional rehearsal style' tends to be used, with little discussion among teachers about experimenting with different styles to aid the children learning (Liao, 1996). Research in Taiwan into an effective and appropriate approach to children's choral singing remains undeveloped.

According to Liao's (1996) survey, the majority of choral teachers tend to use demonstration to facilitate their teaching, with the use of gesture as a strategy being adopted least. However, it is apparent from other research (e.g. Dickson, 1992; Durrant, 1998) that gesture may be of key importance in adding to the training skills of the choral conductor. The Taiwanese Dalcroze Society was founded in 1998, focusing on movement in developing musicality and musical concepts, but remains a limited area of practice in general music education. Some music educators have attempted to explore the feasibility of adopting Dalcroze Eurhythmics in choral singing (e.g. Liao, 1996; Lin, 2001). Liao (1996) examined problems in Taiwanese choral training by sending questionnaires to choral teachers. She analysed the choral training difficulties critically and demonstrated the possibility of using Dalcroze's approach to overcome them. Similarly, Lin (2001) took Protestant church choirs in Taiwan as a sample group and suggested that the application of Eurhythmics in choral rehearsal could significantly raise the choral quality. However, these two surveys are limited by their small scale.

Eastern culture strongly emphasises the respect and power of the relationship between elder and younger. In particular, the Chinese long history of education is influenced by Confusian thinking and stresses the importance of respect for teachers. For example, in western culture, students can call teachers by their names, whereas Taiwanese students must address their teachers by their titles, e.g. Teacher Liao. Furthermore, students must

bow to the teacher at the beginning and end of each lesson, or when a teacher gives them something (e.g. returns an assignment). Failure to do this leads to pupils being reprimanded and asked to bow again. Therefore, in traditional Chinese society, the teacher has always received very high respect and held a very significant role in education (Chiang, 1998). The teacher plays a role in cultivating students' good morality. Within this specific cultural influence, where students have been educated to respect their teachers and behave well, the students can be nervous in the classroom, and in choirs, this might lead to the children's bodies being rather too tense and rigid. Although choral teachers know the importance of good posture in relation to good singing, they have not emphasised the development of an efficient, and relaxed body given the cultural expectation of obedience. Unfortunately, in this strict cultural context, students try hard, but are restricted by their rigid bodies. Movement is believed to be an effective means of improving choral singing in the West, but whether it is suitable for eastern countries needs to be critically examined. Therefore, the first aim of this study is to examine the feasibility of using Dalcroze-based movement in choral singing for Taiwanese people. The second aim of the current study is to explore effective training techniques for children's choral singing, specific to the Taiwanese population and the choral world as it exists.

To date, vocal exercises (scales, arpeggios etc.) have been the primary means of developing a good vocal technique in choral rehearsals, particularly the use of vocal patterns to develop a sense of tuning for beginning choirs. The issue of how to improve the quality of vocal warm-up has been popular in the research area of singing pedagogy and choral singing. In western research and choral practice, during the past quarter-century, research on the use of movement as a rehearsal instruction technique has been ardently discussed and its practice has become more widespread (Ehmann,

1968; Gordon, 1975; Weaver, 1977; Henke, 1984 & 1990; Apfelstadt, 1985; McCoy, 1986; Hylton, 1987; Wis, 1993 & 1999; Hibbard, 1994; Caldwell, 1995; Aylen, 1998; Chagnon, 2001). Studies have shown positive results for the purposes of enhancing expressive performance, improving the comprehension of musical concepts, promoting vocal technique and correcting vocal faults. However, the focus of the movement-based approach in vocal exercise sessions and children's choirs is very limited. It appears that no specific study exists which traces how children learn the gesture technique in developing their voice and singing skills. In addition, there has been little systematic research in the area of vocal exercises using gesture as a specific kinesthetic strategy technique. So, a further aim of the investigation here is to explore what types of vocal exercises might be best used especially for improving children's intonation and tone quality.

The reasons why gesture is effective are based on the premise that there is an intimate interrelationship between voice and gesture. The strong link between musical sound and gesture/bodily movement has been explored (Barker, 1989; Davidson, 1991, 1993, 1994, 1995, 2001; Clarke and Davidson 1998), suggesting that gesture not only reinforces expression but also facilitates singing skills. Studies have also shown that conducting gesture affects choral tone (Drause, 1983; Grechesky, 1985; Wis, 1993; Hibbard, 1994; Fuelberth; 2001). One of the aims in this study is to explore more fully the relationship between voice and gesture, especially with children.

The application of gesture technique in choral singing has been examined in the doctoral theses of Wis (1993), Hibbard (1994) and Chagnon (2001). They all believe gesture and movement helped transfer an overt activity into an imagined activity. That is, something experienced in the body, through a gesture or movement, can be stored in the

memory and can be internalised so that it can be drawn upon at a later time to recall the physical sensations without the individual actually having to make the gesture. The researchers discovered that gestures did help the singers to have motor sensations, which assisted in the development of sound sensation, improving vocal technique as a result (Apfelstadt, 1984 & 1985; McKinney, 1994; Greenhead, 2002). Shehan (1987) and Taylor (1989) believed that a gesture and physical movement promote musical memory. In applying gesture technique, singers use their gestures to make the kinesthetic imagery into a kind of picture for the process of developing musical memory, which improves singing ability. A fifth aim therefore is to explore which gestures are useful in the vocal training.

Studies into the use of movement techniques in rehearsal instruction have concluded that the main vocal faults occurred when the body was not sufficiently engaged and needed to be trained more actively in the singing process (Wis, 1993; Hibbard, 1994; Aylen, 1998; Chagnon, 2001). Although the researchers reported that movement facilitates choral learning, what constitutes that essential movement for singing is less clearly defined. It appears that movement can mean movement activities, movement exercises, movement training or movement games. However, movement training designed to improve body coordination and balance, and enhance gesture quality has not been specifically addressed. Indeed, McKinney (1994) pointed out that when "singing is an integrated, coordinated act",

> Good phonation is strongly dependent on good posture and good breathing techniques.... The singer's body must be trained to function as a whole, under the control of the mind, not as a group of separate parts that are locally controlled. Coordinated action is the basis for good phonation (McKinney, 1994: 82).

Emile Jaques-Dalcroze (1967), a great music educator, believed movement training was the most efficient way of co-ordinating the mind (thinking), body (kinesthesia), ear

(hearing), and emotion (feeling). As a result, singers' bodies become more efficient. They can certainly produce a more effective gesture with the result that they are able to produce a more beautiful sound. Thus, the final aim of this thesis is to examine the effect of movement training in improving singers' gesture quality.

So in summary, the following research examines the effects of developing specific gesture techniques and movement training for beginner children's choirs to develop and improve intonation and tone quality. Some reference to the work of Dalcroze will be made in the development of movement training techniques.

Limitations of the Study

This study is confined to an investigation of vocal exercise sessions by using gesture techniques as a means of developing a basic vocal technique for children's choir for beginners. Since there are many aspects of vocal technique that could have been tested in this thesis, a limit was necessarily placed upon the research. The effect of vocal technique therefore focused on intonation and tone quality, since these were found to be the main weaknesses and training difficulties in Taiwanese choirs (Liao,1996).

This study principally focuses on training, and not on the differing styles of trainers. Therefore, for consistency, only one teacher is used throughout. This teacher is the researcher. She has ten years of professional experience working both with the age group studied and in the three training techniques investigated. To refresh and inform her practices for the practical work undertaken in this thesis, she trained with Karin Greenhead for one year. Professor Greenhead is a leading figure in Dalcroze Eurhythmics and offered not only the possibilities of refining and developing the researcher/teacher's skills but also helped with the development of critical reflection.

This enabled the teacher/researcher to develop appropriate analytical skills. In all cases, the empirical work was judged by a minimum of three experts in choral movement training and in all cases the judgments were subjected to inter-rater reliability examination. So, although one teacher may seem like a potential limitation on the validity of testing the movement training versus other warm-up techniques, a number of strategies have been implemented to ensure that the use of only one teacher can lead to:

1. Consistency of the teaching input.
2. Consistency in the judgement of that input.

The study does not discuss in any detailed fashion other specific issues related to applying this kind of gesture technique to vocal repertoires or in the development of musical ability. Gesture techniques were used as a training strategy and a learning mode, and therefore, the effect of each gesture on the specific sound was not tested. Gesture was discussed only in relation to singers and its effect on the choral singers and did not refer to the conductor's conducting pattern. The non-verbal communication of conducting gestures was not the primary focus of this study. Finally, the movement training was also limited primarily to training of the singing body and promoting the quality of gestures.

Hypothesis

There were three main null hypotheses for this study:

H_0 1: There is no difference between three training techniques on children's intonation and tone quality scores.

H_0 2: There is no significant difference between children who receive gesture training on their gesture quality scores whether or not they have received movement training.

H_0 3:There is no association between voice and gesture.

Definitions

The following terms are operationally defined in order to clarify and avoid ambiguity in their use in this study:

1. **Gesture training**: static movement on the spot using primarily upper body gesture, including hands, arms, and knee bends. The main function of the gesture technique was to reinforce motor images to promote vocal technique.

2. **Movement training**: including movement activities and exercises by moving in space to develop the sensation of pictures of sound, travelling through time, space and energy, and controlling one's body weight. The fundamental aim of movement training is to develop a general awareness of the body in balance, co-ordination and control, alignment, and rooting posture.

3. **Gesture quality**: including body efficiency (balance and control, alignment, centeredness, grounding and coordination), mastery of gesture technique (gesture accuracy, expression, flow and ease in performance, flexibility), and coordination of voice and gesture (blending voice with gesture, time-space).

Organisation of Study

The thesis begins with a theoretical consideration of movement-based learning, then observation and experimental studies, followed by practical work. The central issue underpinning all of this work is how gesture and movement training, as techniques for singing, can be adequately defined and understood. To do this, Chapter Two reviews the related literature which covers the physical and voice aspects, explores the theory basis

of the relationship between voice and gesture, and examines the empirical work on movement-based instruction as a choral rehearsal technique.

A pilot study comprising an interview and observations of how children use gesture and movement in singing is reported in Chapter Three. The main research method used in this study is a controlled variable experimental design. Chapter Four provides the details of how the experiment was carried out. Subsequently, the results and discussions are presented in Chapters Five, Six and Seven. Chapter Five compares three training techniques (TT1: no gesture and movement training, TT2: gesture training, TT3: gesture and movement training) for improving intonation and tone quality. Chapter Six identifies the effect of movement training in enhancing gesture quality. Chapter Seven explores the association of voice and gesture; furthermore, how gesture helps the voice is also discussed.

Finally, important conclusions drawn from this study are reported in Chapter Eight. Recommendations for teachers, directors and for additional research are also provided.

CHAPTER 2

LITERATURE REVIEW

Given the over-arching aims of the thesis, it is necessary to ground any new practical work in existing theory and empirical investigation in order to expand the body of knowledge of the research domain in an innovative manner. Thus, this chapter considers the literature currently available. It does this by firstly looking at the general questions of how and why vocal training and body work for choral singers has emerged. It then focuses specifically on vocal work with children. The analysis of the causes of poor choral intonation and tone quality will lead to a demonstration of how gesture may be used to rectify these problems. Finally, Dalcroze Eurhythmics used for movement preparation to create successful motor images and sensations, forms part of the experimental component of this work. Hence, the importance of Eurhythmics related to the development of good movement skills will be discussed. Through an overall consideration of this literature, the particular aims and objectives of the empirical work described in this thesis will emerge.

2.1 The Relationship Between Voice and Gesture

In order to extend the understanding of the apparent links between voice and gesture, the philosophical basis of bodily movement in musical performance will be traced. Furthermore, the gestures used in choral conducting will also provide further more evidence of the association between voice and gesture.

2.1.1 Bodily Movement in Musical Performance

As far back as the Classical Greek writings on music, an intimate link between musical sound and bodily movement has been discussed (Barker, 1989). In recent decades,

cognitive and music psychologists have become interested in discovering the relationship between performance and bodily movement. Davidson (1997) points out that many teachers constantly use different types of movement to produce musical effects. For instance, back in the nineteenth century the violin teacher Baillot (1834), instructed that the Adagio tempo requires 'more ample movements', whereas Allegro needs to be 'tossed off' (cited in Clarke and Davidson, 1998).

In Davidson's work (1991, 1993, 1994, 1995), a series of explicit studies into bodily movement during performance showed a significant link between movement and performance. Davidson (1993, 1995) demonstrated that the performer's body movement reflects the structure of music. In addition, she has shown that movement allows the performer to communicate with and so facilitate the audience's understanding. By observing a pianist in two performances, the results showed the expected relationship between the movement size and expression, for example, the more intense the expressive intention, the larger the movement (Davidson 1994, 2001). In other words, bodily movement reflects the performer's musical expression. Similarly, Clarke and Davidson (1998) undertook two case studies of a pianist and found there were some expressive gestures for particular musical meanings. Body movement plays a vital role in performance, which can help determine the interpretation of the musical expression through the performer's conception of the musical structure.

2.1.2 Gesture for the Stage Performer

Whole body movement plays a critical role in the performing art in general, not only for external aesthetic perception but also for the expression of inner feelings. Schreiber (1980:7) cited Delsarte's philosophy:

> *As the instrument of expression, the body has three venues: gesture (corresponding to Soul), voice (Life), and language or articulate words (Mind).*

Among these three agents, Schreiber focused on language as the weakest.

> *In a matter of the feelings language proves nothing. It has no real value, save in that which is given to it by the preparation of gesture. Gesture corresponds to the soul, to the heart; language to the life, to the thought, the mind. The life and the mind being subordinate to the heart, to the soul, gesture is the chief organic agent. So it has its appropriate character, which is persuasion and it borrows from the other two agents interest and emotion (Delsarte, p.465, cited by Schreiber,1980:7).*

The use of motions and gestures has become a critical part of performing art in classical opera or stage singing (Ehmann, 1968). According to Davidson (2001) and Davidson & Coimbra (2001), body movement and gesture are regarded not only as the physical support of singing process, but also play an important role in expressing emotion. It can be observed that opera singers tend to open their arms gradually when singing a final long note. This supports Davidson's (2001) suggestion that gesture not only helps a vocal expression but also helps support, and sustain the final note. Therefore, gesture might serve another function in facilitating vocal technique. More precisely, the strong interrelation of voice and gesture can be easily discovered through some actions. For instance, the louder the voice, the more forceful the gesture; and the softer the voice, the gentler the gesture. The degree of vibrato used is also reflected in the gesture. For instance, every day observation shows that singers tend to open their arms gradually while singing a crescendo passage and close their arms gradually while singing a decrescendo one.

The gestures used for choral singers have also been explored. After observing a period of choral rehearsals from an exemplary director, Hibbard (1994) found that there appears to be a strong corresponding relationship between the quality of the gesture and vocal tone. She analysed every movement and gesture used in Professor Smith's choral rehearsals for singers through Laban Movement Analysis. Eventually, she concluded

that the gesture quality reflected the voice quality and the combination of effort factors appears to meet the purpose of gesture use. For example, weight effort seems to have a relationship with strength or lightness. A stronger gesture will produce a stronger, fuller, richer tone quality (p.235). Similarly, Wis (1993) also noted that a singer's weak or incorrect gesture also reflected his/her problems with vocal faults.

2.1.3 Conducting Gesture

Gesture, as a non-verbal communication, exists in our daily life in every culture and country. According to Morris *et al.* (1979), people use hundreds of expressive movements every day. Axtell (1991) believes that people use gestures to communicate expressively. Recent works place an emphasis on examining the conducting gesture, as non-verbal communication, in a choral situation. Wiener *et al.* (1972) defined 'non-verbal communication' as non-verbal behaviours with shared meanings which constitute a code through which messages are conveyed by an encoder and responded to systematically and appropriately by a decoder. Based on this definition, Wong (1999) argued that conducting gesture could be classed as a form of non-verbal communication. She observed that conductors play the role of an encoder, using these codes to communicate to musicians and audience, whereas singers are like decoders. Therefore, conducting gesture is regarded as a very important bridge in the communication between the conductor, singers and audience. Effective and expressive gestures are therefore required in order to make a successful performance. So, the skills need to be well learnt and taught.

A certain number of empirical studies concerning conducting as non-verbal communication have shown that an intimate relationship exists between conducting gesture and the performance (Poch, 1982; Drause, 1983; Grechesky, 1985; Byo, 1990;

Dickson, 1992; Holt, 1992; Jordan, 1992; McCoy, 1994; Benge, 1996; Wong, 1999; Billingham, 2001; Yontz, 2001). Grechesky (1985) examined the effect of verbal and non-verbal behaviours in choral conducting and found that the more body movement the conductor used, the more expressive the vocal performances. Drause (1983) investigated the effect of conducting stance and motion in children's choral training, finding that clarity of gesture definitely affected the choral tone. Fuelberth (2001) also discovered the similar effect, noting that inappropriate conducting gestures caused singers high vocal tension and resulted in a poor tone quality. Furthermore, Smith, the subject of Hibbard's (1994) study, expresses how conducting gesture affects singers' tone by observing conductors. He experimented by using different gestures with the singers and noted that: " I became convinced that what you did and how you moved had everything to do with the way the group sounded (p.155)."

Benge (1996) has systematically analysed conducting gestures drawing on Laban Movement Analysis, a technique commonly used in contemporary dance. According to the analysis, he concluded that there were certain associations of movement to musical contents:

1. Dynamics: larger movements were associated with louder dynamics; whereas smaller movements were associated with softer dynamics. Crescendos were often represented by bound flow (restraining or creating a sense of caution in the movement), advancing, spreading; whereas decrescendos were represented by a decrease in spatial coverage, a narrowing of stance;

2. Vocal quality: movements lower in the 'kinesphere' were associated with heavier articulation and darker timbre. Movements higher in the kinesphere appeared to be associated with lightness;

3. Articulations: quick and sometimes 'strong' movement was often associated with

accentuation and emphasis. A change in 'weight' appears to be associated with the heaviness or lightness of the attack. Lighter, pontillistic movement (dabbing) was associated with staccato; whereas floating, sustained movement was associated with legato;

4. Mood changes were often found to be represented by 'effort' changes. (Benge, 1996:58-59)

According to Benge's findings, conducting gestures assisting the link between music, its meaning, and its execution.

2.2 Gesture and Movement as a Rehearsal Strategy in Choral Situation

The use of movement as a choral rehearsal technique has been ardently discussed and has become widespread throughout the world in recent years (Ehmann, 1968; Gordon, 1975; Weaver, 1977; Henke, 1984, 1990a, 1990b, 1993; Apfelstadt, 1985; McCoy, 1986; Hylton, 1987; Wis, 1993; Hibbard, 1994; Caldwell, 1995; Aylen, 1998; Chagnon, 2001). Some use it as the primary rehearsal approach, whereas others use it as a supplemental method. For the majority, the idea of adopting movement in the choral context was influenced by Dalcroze Eurhythmics, and some were also influenced by Alexander Technique.

2.2.1 The Application of Movement in Choral Settings

The importance of movement in choral situations has been recognised for several decades. In a book on choral directing, Ehmann (1968) found the use of movement in choral training was very effective particularly for amateur singers. There were some physical activities included in the rehearsal such as clapping and tapping, feeling the pulses and rhythms, hand and arm gestures expressing the phrases. Ehmann, who

believed that through whole body movement, singers could internalise the musical concepts and vocal techniques, stated:

> *Through such exercises the singers get a visual concept of the structure of the piece, of the movement, and relationships of the parts to each other; the singers literally experience the musical composition in their own bodies, and the acquisition of new concepts and a new grasp of the music is now absorbed and translated into the singing act itself with the result that the music has become more animated and alive (Ehmann, 1968: 89).*

As a result, singers are able to produce a better sound. Gordon (1975) who studied the work of Abramson (1973), Ehmann (1968), Findlay (1971) and Pennington (1925), and who had been influenced by Jaques-Dalcroze, categorised movement exercises for singing into seven parts (1) metre, (2) tempo, (3) rhythm, (4) dynamics, (5) phrases and phrase endings, (6) structure, and (7) general alertness and self-control, all ranging from simple to complicated movements. He suggested that music concepts such as rhythm, pitch and harmony could be improved and reinforced by kinesthetic involvement.

Henke (1984, 1990a, 1990b, 1993), an Eurhythmics expert, has demonstrated how the Dalcroze approach could be effectively applied in choral and band rehearsals. He concluded that Eurhythmics is not only a dynamic method to facilitate music learning, but also a powerful one to enhance choral quality. Moreover, Caldwell (1995), a voice and Eurhythmics teacher, confirmed Henke's ideas, and stated that Dalcroze's method was a perfect way to train a singer to sing expressively.

Apfelstadt (1985) and Hylton (1987) also claimed the effectiveness and importance of using movement in the choral rehearsal. They demonstrated examples as to how movement can help singers to better understand and perform the texts. Furthermore, they provided some examples of using gesture techniques in vocal warm-up sessions to

improve intonation and tone quality. Other authors such as Grant (1987) and Ware (1998) also demonstrated the use of gesture technique to improve intonation by simply raising and lowering the hands. However, the gesture techniques used by these four writers merely serves as a supplementary method by example.

Surveying the literature more broadly, there are six empirical studies which have investigated the movement-based strategy in choral instructions. Weaver (1977) used Dalcroze Eurhythmics in a sequenced approach to develop vocal, choral, and musical concepts. The operational definition of 'movement' in this study was "bouncing to the pulse of the music". A significant improvement in vocal production, vocal technique, range, diction and musical effects was found, however, the results were achieved highly subjectively, relying solely on the rating of the experimenter who was also the teacher.

McCoy (1986) examined the effect of movement as a rehearsal technique on choral performance proficiency, metre discrimination ability, and the attitude of students towards participating in a choral ensemble, using a quasi-experimental control group design. The experimental treatment was tested on two types of groups, advanced choirs and less-advanced choirs at the high school level. The movement activities were designed to accomplish three primary purposes: (a) to promote awareness of the steady pulse and subdivisions of the pulse, (b) to heighten consciousness of accent patterns inherent in metrical groupings, and (c) to reinforce concepts of phrasing and dynamics (p.26). The majority of movements she used were primarily on the spot (e. g. stepping the pulse, tapping, snapping) rather than the movement in space. Choral Performance Rating Scale, the Music Achievement Test, and a researcher-designed attitude rating scale were used to assess the singers' achievement. The results showed a significant difference between experimental groups and a control who used movement in the rehearsals in tempo, and balance/blend. Student attitudes supported the notion that the

movement activities in the choral rehearsal enhanced the participants' overall musical experience.

Surveying the research, it is clear that the earlier studies on movement-based instruction in choral rehearsal emphasised the development of musical concepts rather than focusing on any subtle techniques for improving vocal production.

In recent years, the movement and gesture used in choral settings have emphasised the improvement of vocal and choral techniques. Wis (1993) examined the use of gesture and body movement to facilitate learning and to enhance musical experience in choral rehearsal. Influenced by Lakoff and Johnson's (1980) metaphor theory, she felt that gesture and movement used by the singers functioned as the link between the concrete (bodily domain) and the abstract (conceptual domain) which thus helps singers to improve vocal techniques and understand music more deeply. In her study, she observed two choral directors who used movement and gesture in choral contexts and did post-interviews. She concluded the gesture is used for two reasons:

1. *Gesture draws from the natural freedom and energy found in daily movement activities and applies it to the singing process.*

2. *Gesture is more effective and less subject to misinterpretation than words when attempting to get the essence of a vocal problem or a musical concept. (Wis, 1993:247)*

Finally, she proposed that movement-based teaching is more effective and can be applied at all age levels.

Hibbard's (1994) data from an exemplary choral conductor enabled her to group the movements used into several categories according to instructional purposes; she then analysed these using the dance-oriented Laban Movement Analysis System. From her observation, the general results were:

(a)   all movements function as a means of calling the singers to attention;

(b)   all movements provide a visual; physical (kinesthetic); and aural experience for the singers;

(c)   all movements are designed to heighten the awareness of differences in sounds (feeling);

(d)   large movements tend to be used for more general purposes and smaller gestures tend to have very specific purposes;

(e)   the majority of movements are gestures using the hands, arms, and upper body;

(f)   a majority of the movements have either a direct or indirect effect on tone quality (Hibbard, 1994:195).

Movement instruction is so effective according to Hibbard because movement provides a multi-modal means of learning (visual, aural, and physical) which reinforces the singer's understanding of tone production. That is, singers have a physical sensation and a visual image for a particular musical idea, which is explored in movement. They can connect between movements in space, time and energy, and sense their relationship to gravity. When a movement works with a sound, it helps to coordinate the mind (thinking), body (kinesthesia), ear (hearing), and emotion (feeling). Therefore, aural experience is reinforced and strengthened through the motor image. After training, movements can evoke the correct effects for musical sound production.

Hibbard stressed that movement functions merely as a fun activity if the conductor does not know how to use it properly. In contrast, if the conductor is an expert in this technique, gesture and movement can be a profound help to the singers in resolving any musical and vocal problems. Hibbard (1994) developed a grounded theory of the use of movement as an instructional tool in choral rehearsals, indicating useful techniques and exercises to be used.

Similarly, Aylen (1998) followed Hibbard's work confirming her findings by observing three choral directors who used the movement as a pedagogical tool in choral rehearsals

in the UK. Also, by analysing questionnaires from four group choral members, the advantages and disadvantages of movement-based rehearsal were identified. The benefits of using movement in choral rehearsal included: (1) raising of the common consciousness of the choral group; (2) preparing the singers physically for singing and enabling them to relax; (3) enhancing group dynamics; (4) gaining more enjoyment and concentration; (5) improving the singer's memory and reacting better to the conductor's gesture; (6) saving rehearsal time; and (7) giving singers more responsibility for their voice production. The disadvantages included: (1) movement sometimes makes young singers over-excited; (2) over-use of movement with little thought might cause a counter-productive effect; (3) people tend to have a negative attitude to movement because of cultural reasons and feelings of embarrassment.

Most recently, Chagnon (2001) designed a collective case study, from three choral directors and two other cases from Wis (1993) and Hibbard (1994), to examine the effect of a movement-based approach in the choral context with older students. He then made a comparison of how these choral directors used movement and gesture in the choral rehearsals including their philosophical basis for using movement-- why, when and how they used it. In addition, their reasons for using movement were also discussed. He concluded that incorporating the use of movement-based activities was an effective instructional technique regardless of singing and music ability. He suggested that the movement-based choral strategy was creative; therefore, the choral conductors were encouraged to develop their own pedagogy based on their needs and comfort level of adopting it.

It appears that much research attention has been paid to older singers; therefore, how the movement affects the children's choral learning still needs to be investigated.

2.2.2 The Purposes and Contents of Gesture and Movement Techniques in Choral Rehearsals

Although the technique of using movement in a choral situation has become a very popular topic for discussion, there has been no specific study to trace the effect of this kind of technique quantitatively. Moreover, studies into movement techniques have failed to look at specific areas like gender or competency. Whether the gestures and movements can be categorized to one sort of vocabulary is also a controversial issue which needs further investigation. Some studies have, however, made arrangements of the movements for different vocal or musical purposes and techniques; for example, in Hibbard's (1994), Wis's (1999), and Chagnon's (2001) doctoral dissertations. According to Wis (1993), gestures could be categorised into: (1) those directly simulating a commonly experienced activity, such as a football pass; and (2) those that were not dependent on context, such as a circling motion.

In addition, many physical exercises were presented in the articles of Ehmann (1968), Gordon (1975), Weaver (1977), McCoy (1986), Apfelstadt (1985), Hylton (1987), Grant (1987), Ware (1998), and Wis (1999), to show how the use of movement in physical/vocal warm-ups can resolve vocal/choral problems. Generally speaking, the movements identified in the research fall into the following two broad categories:

A. Body movement

The fundamental purposes of the movement are for physical warm-up, enhancing the expressivity of performance and improving the comprehension of musical concepts.

(a) Movement in place: such as clapping, stretching, bending, swinging and swaying.

(b) Movement in space: such as walking, running and sliding.

B. Gesture (primarily hand gestures)

Most of the gestures are used to improve vocal technique and to correct vocal faults. They fall into two broad categories based on their functions:

(a) Direct: the gesture is a direct description of the sensation of the sound which serves as a metaphor. The majority of these gestures are for improving motor image, tone quality and expression such as circling for legato, and pointing for vocal maintenance and focus.

(b) Indirect: the gesture has a less direct effect one a vocal line. The main functions of these gestures are for correcting the faults in voice or motor images. For example, simply lifting the hand in order to raise a flattened song tone.

The movement activities and gesture techniques (Wis, 1993; Hibbard, 1994; Aylen, 1998; Chagnon, 2001; Greenhead, 2002) were mainly used in vocal warm-up. The fundamental purposes of using movement in the warm-up process are:

1. To get physically warm and improve circulation,
2. To get body and mind ready for singing,
3. To develop vocal skills (e.g. intonation, tone quality),
4. To improve vocal production (e.g. breathing, resonance, articulation),
5. To release tension (e.g. back, jaw, shoulders, knees, neck),
6. To improve body alignment, balance, centredness and grounding,
7. To develop sensitivity to nuance,
8. To reinforce musical concepts,
9. To establish rhythmic accuracy,
10. To enhance musical expression and interpretation.

In contrast, in singing songs, the primary purposes of using movement are to solve the vocal or musical problems.

2.2.3 Reasons Why Gesture is Effective

The previous sections have demonstrated a remarkable effectiveness of gesture technique in enhancing rehearsal qualities. The reasons why it is effective are discussed below:

Gesture conveys what words cannot

It was believed that actions speak louder than words. The gesture itself possesses a powerful characteristic in communicating. Laban (1988:92) stated that: "Movement can say more, for all its shortness, than pages of verbal description". Wis (1993) and Hibbard (1994) point out that gesture is less subjective than words. Gesture allows meaning to be conveyed with fewer misinterpretations as the meanings are often less open to interpretation if they are adaptive, regulatory and illustrative. Furthermore, gesture can sometimes convey the ineffable musical concepts which words cannot. For example, it is very difficult to explain what a soft palate is to a child. By using a simply gesture (e.g. lifting the hand) the child can be easily encouraged to lift the soft palate.

Kinaesthetic experience facilitating learning

According to Piaget's (1952) developmental theory, children know the world as it relates to their bodies at the "sensorimotor stage"; that is they begin interact with the environment and gain any knowledge through their own physical experience. So, for example, when a baby starts to move through space, it understands the sensation and a concrete concept of movement towards an object. Therefore, physical experience is important for how people construct their understanding.

Gardner (1983) supported the close link between the use of the body and the deployment of other cognitive powers. He stated:

> *The individual's perception of the world is itself affected by the status of his motor activities: information concerning the position and status of the body itself regulates the way in which subsequent perception of the world takes place. In fact, in the absence of such feedback from motor activity, perception cannot develop in a normal way (Gardner, 1983:211).*

Galvao and Kemp (1999) insisted the importance of kinaesthetic sensation for music learning. Kemp (1990) argued that the whole body is a thinking mechanism. He stated that "the inner mental life of the child engaging in music must involve the internalisation of the musical sound itself" (p.88). He believed the tactile and kinesthetic experience of musical events and elements through body movement and gesture will give children a concrete sensation, which when internalised, helps them to act in a musical way in performance and creative work. Without an understanding of physical sensation, surely the following problems might emerge:

1. Poor coordination, tone and dynamic control,

2. Lack of rhythmic vitality, rhythmical insecurity and no flow,

3. Problems with cross-rhythm,

4. Inability to maintain a steady tempo or sustain a continuous motion,

5. Inability to modify: tempo, tone, dynamics gradually or quickly: poor adaptability,

6. Poor posture, centredness, grounding, alignment and balance,

7. Poor presentation—poor inner 'picture' (motor image) of what something should sound/feel like,

8. Playing with parasitic tensions and anxiety,

9. Ensemble difficulties (Greenhead, 2002).

Gesture promotes musical memory

Memory plays a critical role in any kind of learning process. Mead (1994) stressed the importance of memory by citing Dalcroze's theoretical basis; she stated:

> *Dalcroze believed that in the study of music students should continually be cultivating a memory bank of aural, visual and kinesthetic images which could be recalled at any time for reading, writing, performing or creating music. The stronger and more carefully defined the images, the longer and more precisely they remain in the memory. The wide variety of experiences in the Dalcroze approach can often complement and strengthen the image (Mead, 1994: 5).*

One of the important characteristics of Eurhythmics is that it evokes sensations that create motor images. According to the above statement, it is clear that gesture provides a rich sensory input— aural, visual and kinesthetic, which is believed to enhance memory for music (McCoy, 1986; Shehan, 1987; Taylor, 1989; Hibbard, 1994; Wis, 1993; Haasemann & Jordan, 1991; Oglethorpe, 1996; Gordon, 1997; Labuta & Smith, 1997). Wis (1993), Hibbard (1994), Aylen (1998), Greenhead (2000) and Chagnon (2001) believe that gesture technique creates bridges between different types of people and musical learning. As mentioned before, providing multi-modal learning or feedback will surely improve children's singing accuracy (e.g. Welch, 1985; Apfelstadt, 1986; Phillips, 1992).

In addition, if the motor images are well organised and internalised, it will also strengthen memory. Shehan (1987) feels that gesture is a mnemonic device which aids the choral singers in learning and memory. She said if a muscular movement is repeated enough, the muscle patterns might deepen the memory and become automatic and subconscious. Gordon (1997) supports this and stressed that without a good comprehension and grasp of information, we quickly forget it. He said:

The brain is a specific type of intelligence in the body, whereas the body, in its totality, is the source of many types of intelligences. When we attempt to appreciate anything without a deep sense of understanding, our higher brain, filled with irrelevant information or no information at all, prevents us from listening to our bodies (Gordon, 1997: 33).

Our physical sensation will strengthen the structures of memory.

According to Snyder (2000:95), "schemas are organised sets of memories about sequences of events or physical scenes and their temporal and spatial characteristics, which are built up as we notice regularities in the environment". Welch (1985), based on Schmidt's (1975) hypothesis, proposed a schema theory to stress the importance of a correct schema formation for singing development. In this case, choral singers use gesture in rehearsals to form one sort of mental image as a schema. When the sound sensation in conjunction with the creation of a proper motor image is well stored in long-term memory, these images will be formed as a repertoire of gestures. Wis (1993), Hibbard (1994) and Chagnon (2001) confirmed that their observers all agreed if these kind of images are internalised, they can be recalled later without making a gesture. Because the singer's use of gesture is closely related to conducting gestures, the director can easily use gesture to remind the singers of techniques that are built in rehearsal. Smith pointed out:

Movement provides a kinesthetic memory, or use of "muscle memory," that, when the same movement is seen later in the conductor's gesture, will remind them of the earlier physical experience and evoke the same vocal/physical/musical response (Smith in Hibbard 1994: 160).

Gesture as Metaphor

A metaphor is a relationship between two categories or here, two schemas. According to Lakoff and Johnson (1980), cognition cannot separate from bodily experience, and

metaphors provide the link between the concrete (bodily domain) and the abstract (conceptual domain). Wis (1993) supports this and states that metaphorical mapping from our experience helps students to approach a particular vocal problem or understand an abstract musical concept. Larson (1993) maintains that we understand melody metaphorically in terms of our own experience of moving in and through the world. Snyder (2000) stated that metaphorical mappings are grounded in fundamental embodied cognitive structures (image schemas) generalised from recurring physical experiences, especially the experience of our own bodies. He gives an example to explain the difficulty of describing 'up' and 'down' without visual images or physical gestures referring to our own bodies.

Similar to Snyder, Cox (1999) discusses the metaphor of 'high' and 'low', positing that the metaphorical conceptualization of "higher and lower tones" can be motivated by the varying amounts of air, effort and tension. This can be applied to vocal and wind music. Many teachers have realised that metaphor helps to make the abstract concepts of teaching more tangible. Gordon (1997) and Swanwick (1999) indicated that metaphor is a window into children's classification skills, and children use these skills to build their understanding of the world. Metaphorical techniques help children to perceive sound and therefore understand how it is made. In this sense, it is easier to understand why gesture is effective in improving vocal sound.

The studies reviewed above show the positive effect of gesture and movement in choral rehearsals to aid vocal techniques. The use of kinesthetic sensations to strengthen the motor pictures in memory seems to have a strong impact on choral singing, leading to a more successful performance.

2.3 Vocal Techniques and the Use of Gesture

When starting a children's choir, the most important thing is to develop the children's singing voices and to foster correct and healthy singing. Vocalisation is regarded as a critical means of achieving these goals. In this section, the issue of developing the children's voice will be discussed.

2.3.1 Vocal Work with Children

Achieving a beautiful tone is the goal of art singing. Some choral directors rely heavily on vocalisation to develop an ideal choral tone, so they plan a programme of exercises to train their singers to sing efficiently. In contrast, it seems that some of them do warm-ups only because they think they are supposed to use them or use it as a formal way to start a rehearsal (Guthmiller, 1986; Lamb, 1988).

Assessing the literature as a whole, it seems that vocalisations not only serve the fundamental goal for warming up the voice but also benefit many aspects. Robinson & Winold (1976), Apfelstadt (1985) and Smith & Sataloff (2000) claimed that well-planned vocal exercises help singers focus mentally as well as vocally on task during choral rehearsals. To sum up, if used properly, the vocal exercise can be a very powerful technique to enhance choral quality in training and performance rather than simply freeing the singer's voice in readiness for singing.

Vocalises are commonly used for the purpose of developing resonance, achieving blend, and extending vocal ranges. Christy (1983) and Saathoff (1995) classified the vocalises into five melodic categories: (1) sustained tone on one pitch, (2) the scale, (3) the arpeggio, (4) the combination of the sustained, scale, and arpeggio exercise, (5) others—these do not fall into any of the other four categories. Vocalisation exercises

generally do not involve complicated melodies and rhythms. Also, the vocal patterns have no text, so the singers can concentrate on developing the skills without having to think about textual content (Grant, 1987; Lamb, 1988; Daneil, 1993; Lupica, 1996). Dettwiler (1989) suggested that developing aural skills through vocalisation is crucial. Guthmiller (1986) also argued that vocalisation could develop healthy voices and the potential for expressive singing especially for young beginning singers. This author believed that vocalisation is an important tool for the conductor to isolate technical problems and develop an awareness of the relationship between vocal function and the expressive demands of music. Boyd (1970) believed that vocalisation is the best time for teaching and polishing choral tone quality and vocal control.

The purposes of vocal exercises

The following list offers a summary of the purposes of exercises from vocal technique or choral books (Boyd, 1970; Fenton 1978; Dettwiler, 1989; McKinney 1994; Linklater, 1995; Saathoff, 1995; Lupica, 1996):

1. To 'warm' the voice, to prepare for general work.

2. To develop vocal fundamentals—respiration, phonation, resonation, and articulation.

3. To develop vocal skills—intonation, tone quality, flexibility and agility, dynamics, legato and staccato.

4. To develop musical skills—ear training, aural sensitivity, aural skill, musicianship.

5. To correct vocal faults.

6. To extend the vocal range.

7. To develop a healthy voice.

8. To develop choral techniques.

9. To focus choral members attention.

10. To solve vocal problems or interpretation.

11. To prepare repertoire in an efficient manner.

It is clear that vocalisation offers several functions. In particular, it helps in the development of young children's vocal skills (e.g. intonation and tone quality). Therefore, the vocal practice sessions in this current study were designed to develop the child's singing voice.

Vocalisation techniques for children

It is believed that if the short vocal exercises are performed properly, they will enhance tone quality for children. Caldwell (1995:121) noted "don't practice harder or longer; practice smarter". To achieve 'smart' vocalisations, Shui (1992), Lupica (1996), Caldwell (1995), and Durrant & Welch (1995) believed that variation was of central importance. For example, the director can simply vary five-note descending scale to make the practice more engaging:

1. Change the vowels and consonants

2. Change dynamics (*piano* to *forte*, decrescendo and crescendo)

3. Change the articulation (legato, staccato)

4. Change the tempo

5. Change the tonality (major and minor)

6. Clap and breathe on the fixed beat

McKinney (1994) suggested that vocal exercises might start in the most comfortable range, while Kaplan (1985) noted that they could start in the low-middle vocal range and end in the high-middle range. In order to avoid chest singing and develop head voice for children, Chivington (1998) and Kegerreis (1998) suggested beginning only

from the C above middle C; whereas Langess (1997) encouraged beginning in a medium-low place. For children, Phillips (1992) claimed that the children's vocalises should begin in the upper voice and move downward into the middle register. The best vocal range to be sung, according to Chivington (1998), is from F or G below middle C to at least an A above the treble staff. Shui (1992) agreed with this and added that children's most comfortable mid-range note is B or Flat B, therefore, it is good to develop the voice from B to go either up or down an octave. He also stated that beginners cannot sing beyond or below treble staff, but they can reach G2, A2 or B2 through training. So these should be the goals of a training programme.

The most common vocal exercise to start and develop in the young voice is the five-note descending scale (beginning in the upper voice and moving downward into the middle register). It is believed that the five-note exercises using upper register singing can develop children's head voice (Ehmann, 1968; Phillips, 1992; Shui, 1992; Chivington, 1998; Kegerreis, 1998). After a historical overview of this area, Phillips concluded that chest-voice singing has a potential to damage a young voice and produce an unmusical quality. He suggested that the lower register was best ignored. Because of this, the downward pattern is also commended for extending the voice range (Boyd, 1970; Phillips, 1992; McKinney, 1994).

In order to develop head-voice, soft singing is suggested (Boyd, 1970; Phillips, 1992; Shui, 1992). Phillips stated that loud singing results in a lower sound (chest-voice), which can damage a young singer's voice. Doscher (1987) supported this and said:

It is important to note that a low, steady flow is preferable to a high fluctuating one. Particularly for young singers, there is great danger in the use of high breath pressure before the muscles of the neck and pharynx are sufficiently developed (Doscher, 1987: 21).

Lupica (1996) and Langness (1997) both agreed with this and, furthermore, also stated that soft vocalises are successful for choral intonation and blending.

The "oo" vowel used in the training of children's voices in the descending five-note pattern is popular, because it encourages the children to drop the jaw, relax their tongues, round the lips and open the throat (Husler & Rodd-Marling, 1976; Phillips, 1992; Shui, 1992; Daneil, 1993; Chivington,1998). Daneil (1993) suggested the sequence for teaching vowels is from "oo", "oh" "ay" "ee", to "eh".

Clearly then, directors have to consider their singers' needs and levels when designing vocal exercises.

According to Liao's (1996) survey of Taiwanese choirs, choral directors identified intonation and tone quality as weaknesses and the most difficult aspects of the young chorister's art to correct. Therefore, it is crucial to develop a good technique in both intonation and tone quality during rehearsals. In order to deal with the problems of intonation and tone quality effectively, it is vital to pinpoint the specific causes of these problems, and to know how to correct them. In the following sections, children's intonation and tone quality development will be examined. Furthermore, the factors of faulty intonation and tone quality and their correction will be explored. Finally, how to use gesture technique to improve intonation and tone quality will be addressed.

2.3.2   Intonation

Fundamental to good singing, regardless of whether as an individual or in a group is the ability to sing in tune.

Children's singing accuracy

Over half a century most research in this domain has focused on poor pitch singing (Bentley, 1968; Joyner, 1969; Rutkowski, 1990 & 1996; Welch, 1979a). Accuracy has a relationship with children's singing development. Children's singing accuracy has been discussed variously. The following summaries were drawn from the previous studies on children's singing accuracy:

1. Individual or group— Children appear to sing more accurately when singing alone than in unison (Goetze, 1985; Goetze & Horii, 1989; Rutkowski, 1996).

2. Text or neutral— Children sing with a more accurate pitch when singing with a neutral syllable "loo" (Goetze, 1985).

3. Vocal model— A child's voice is the most effective model (Green, 1990). Children's singing voices were more greatly improved by a female voice model than a male one (Small and McCachern 1983; Green, 1990; Tatem, 1990; Howle, 1992; Phillips 1992;Yarbrough, 1992).

4. Gender— In general, girls sing more accurately than boys (Goetze, 1985; Goetze & Horii, 1989; Stauffer, 1985; Phillips, 1992).

5. Psychological and physiological maturity— Older students sing more accurately than younger ones (Ramsey, 1983; Goetze, 1985; Goetze & Horii, 1989; Phillips, 1992; Cooper, 1995).

6. Vocal range— A proper vocal range for children will improve accuracy. (Welch, 1979; Goetze, 1985). Too high a tessitura will cause a child to strain the voice; whereas a low tessitura may promote chest voice singing or shouting (Apfelstadt, 1986).

7. Single note or vocal patterns— Children tend to match the tone more accurately when presenting a short pattern than a single note (Davidson, 1985; Tatem, 1990; Howle, 1992).

8. Interval— Children sing more successfully in the smaller intervals of seconds and thirds than a larger interval (Davidson, 1985; Tatem, 1990; Howle, 1992).

9. Pitch progression— Children sing more accurately when descending, rather than ascending (Madson, Wolfe and Madsen, 1969).

Development of vocal accuracy

According to Joyner (1969), in order to sing in tune, one must have the ability to do three things. Firstly, one must be able to hear and discriminate the stimuli. Secondly, one must be able to remember a note and finally reproduce it. Apfelstadt (1988) defined these three components as perception, tonal memory and vocal control. Besides these components, she added two other factors: heredity and environment. Goetze (1985) agreed with Apfelstadt and said that the process of singing involved cognitive (pitch discrimination and tonal memory), psychomotor (a responsive vocal mechanism) and affective (attention to one's own voice and motivation) elements. Similarly, Grant (1987) stated that to reproduce any pitch, one needs to do three things: listen, think, and sing. Christy (1983) and Phillips (1992) confirmed these ideas stating that vocal production depends on both mental and physical factors. Phillips stated:

> the ability to hear and decode pitch (pitch perception) and to remember pitch (tonal memory) are the psychological requirements. The physiological action involves the closing and tensing of the vocal folds and the pressure of the breath. If these parameters are not coordinated properly, accurate pitch production is hampered (Phillips, 1992:25).

Welch (1994) also defined singing constructs with perception, cognition, physical development, maturation, society, culture, history and internationality factors. In a negative way, Sundberg (1987) noted three possible explanations for inaccurate singing as failure in perception, incorrect mental picture and specific muscular problems. To sum up, the three fundamental abilities of pitch perception, tonal memory and vocal coordination are the core factors to affect accurate singing.

Pitch perception and aural memory

The first and critical step for teachers is to help children to imagine the pitch to really hear it (Goetze, 1985; Apfelstadt, 1988; Phillips, 1992). Once accurately heard the child

can then begin do work on the mechanism to reproduce it in singing. Providing a rich learning modality was shown as having a positive effect in aiding pitch perception and resultant development of accurate singing (Phillips, 1992; Apfelstadt, 1984&1986; Mueller, 1993; Persellin, 1993; Hibbard, 1994; Caldwell, 1995, Langness, 1997). For example, showing the pitch by hand levels and providing the pictures for the melodic contour are suggested by many music educators as the best strategies to reinforce pitch perception. Students' learning modality (visual, kinesthetic, aural, or a combination of any two or all three modes) in each classroom or choir varies and each person has his/her preferred modes. Apfelstadt (1984) expressed that rote singing (auditory model alone) was insufficient to develop vocal accuracy because students soon forget what they are taught. Phillips (1992) and Caldwell (1995) suggested a mixed modality of teaching-learning styles is the best way, to exploit the different modality preferences.

Gordon (1997) defined 'audiation' as the activity of hearing music silently without presenting the sound physically. Jordan (1987) and Gordon (1997) stressed the importance of audiation in developing tonal memory. Goetze, Cooper, and Brown (1989) also stated that the first requirement for acquiring accurate singing was to attend to and remember kinesthetic sensations and the accompanying aural feedback. Accordingly, it can be seen that the singer must develop a keen sense of inner hearing. It is believed that this kind of ability is essential for music learning especially in developing pitch accuracy.

The music educator Dalcroze believed that developing inner hearing resulted in a more conscious awareness of muscular sensations involved in singing (cited in Mead, 1994:1). Mead (1994), a follower of Dalcroze, suggested that solfège aural training exercises have a positive effect for developing inner hearing and sharpening the musical ear.

Henke (1984) adopted Dalcrozian solfège-rhythmique in choral training and found it to be effective in developing aural perception, resulting in a better choral sound. According to Taylor (1989), kinaesthesis and bodily movement plays a crucial role in promoting musical memory. She found that the use of physical movement or gesture as a strategy for encouraging musical memory led to greater success in a recognition test than a conventional approach. In addition to the application of movement techniques, it appears that games such as echo singing and tone matching can also help children's tonal memory (Apfelstadt, 1984; Grant, 1987; Jordan, 1987; Phillips, 1992; Langness, 1997). Furthermore, these authors have agreed that repetition of singing songs is also important. But it is obvious that presenting an ideal vocal model to children is necessary because they tend to imitate the tone. As discussed before, a female model is better than a male one. A light and relatively vibrato free voice for presenting the model is recommended (Goetze, 1985).

Vocal Coordination

Many music educators have found that children are able to listen and memorise but unable to produce a successful vocal tone because of control problems (Joyner, 1969; Welch, 1979, Phillips, 1992). It is believed by many authorities that at least 90% of faulty intonation is due to vocal production problems and not a hearing insensitivity to pitch. Phillips (1992) and Phillips & Aitchison (1997) proposed that singing is a psychomotor skill; therefore, the coordination of vocal folds, breath, resonators and articulations is very important for accurate singing. Grant (1987) confirmed this and stated that the key to being able to sing in tune is the coordination of the ear and voice. Therefore, the importance of vocal instructions in improving accurate singing cannot be ignored. Choral directors, in particular, see the needs in choral rehearsal. Thus, the following section focuses on choral intonation.

Choral intonation

Music educators' interest in pitch accuracy for classroom children centres on studies of natural singing, whereas choral directors look at specific aspects of art singing. The development of vocal techniques to improve choral intonation has become a common goal for every conductor. Thus, the literature drawn on here comes from the choral educator's writings.

Marvin (1991) wrote of good choral intonation:

> Pitch and timbre together define intonation. To sing in tune, therefore, means to unify the pitch—to bring all voices into like frequencies and compatible timbres (Marvin, 1991:27).

Tamte-Horan (1989:126) noted that choral intonation can be thought of in two ways: (1) the intonation of the singers in relation to each other (individuals in relation to the section and sections in relation to the choir); and (2) the intonation of the choir in relation to the initially established pitch. Yang (1994) claimed that choral intonation involved (1) vertical pitch accuracy and (2) horizontal pitch accuracy. From these points of view, it is clear that a good choral intonation demands more effort than individual pitch accuracy. In other words, individual accuracy is fundamental but not enough in choral settings. Choral singing requires consistency and uniformity in many aspects such as pitch, and vocal production and vowel formation. For the acquisition of a good choral intonation, the director not only plans a structured rehearsal but also needs to train the singers to listen to each other. Therefore, it is crucial for choral directors to find the factors affecting intonation and remedy them in an effective way.

Causes and corrections of poor choral intonation

There are many factors affecting good intonation, which are inter-related. A certain number of factors, recorded in historical literature reviews, are reported by voice

teachers or choral directors, and range from general to very specific points. Although their emphases and categorisations differ, the possible causes and corrections are well described in the literature. In addition to the problems of pitch perception and tonal memory as mentioned previously, the following list summaries the most frequent causes of faulty intonation, which are divided into four categorisations: (1) non-musical factors, (2) compositional structure factors, (3) performer factors, and (4) technically-related factors (see the following for full details: Robinson & Winold, 1976; Lee, 1977; Heffernan, 1982; Christy, 1983; Kaplan, 1985; Grant, 1987; Doscher, 1988; Tamte-Horan, 1989; Marvin, 1991; Phillips, 1992; Wang, 1992; Yang, 1994; Lupica, 1996; Thurman *et al.*, 1997; Chivington, 1998; Ware, 1998; Greenhead, 2002).

Non-musical factors

1. Temperature—the rehearsal room is too hot or too cold

2. Poor weather and humidity

3. Poor rehearsal time

4. Rehearsal room—poor acoustics in the room, lack of lighting, too noisy, bad air quality

5. Physical or emotional fatigue

6. Overexcitement or fear

7. Lack of interest, laziness or boredom

Compositional structure factors

Common faults affecting intonation related to compositional structure are shown in Table 2.1:

Table 2.1 Summary of the Factors that Cause Sharpening and Flattening Relating to Compositional Structure

Components	Sharp	Flat	Others
Tempo	Too fast	Too slow	
Rhythm		Long duration or monotonous	Complicated rhythm pattern results in a unstable pitch
Dynamics	Too loud (*forte* or *crescendo*)	Too soft (*piano* or *decrescendo*)	
Register	Upper range	Lower range	
Harmony			Complicated harmony results in either sharpening or flattening
Tonality		Minor	
Range	Too high	Too low	
Intervals		M3, M6, M7, m4, m5	

Performer factors

1. Rigidity and tension of any muscles involved in singing—tongue, pharynx, lips, jaw, chest, neck, and arms

2. Improper warming up of the voice or cold voice

3. Poor musicianship—for instance, lack of interval or phrase sense

4. Poor aural ability

Technically-related factors

1. Poor posture

2. Inadequate breath management

3. Poor vocal production

4. Vowel non-uniformity

5. Improper coordination between ear and voice

6. Rigidity or tense conducting gestures

As the current study focuses on elements of an entire singing technique, more discussion will be devoted to these parts.

It is believed that to achieve a good intonation, good respiration, phonation, registration, resonation, and articulation are necessary and the specific element affecting the intonation is often difficult to diagnose. Tamte-Horan (1989:126) noted, in addition to mental concentration and basic pitch-matching ability that good intonation in singing is perhaps most dependent upon (1) good vocal technique (proper phonation and resonation) and (2) the accurate treatment of certain aspects of melody and harmony. He said:

> To establish, maintain, and control pitch, phonation must have adequate and
> sustained intensity, an adequately intense attack, flexibility and control and
> controlled vibrato (Tamte-Horan, 1989:127).

Table2.2 lists the primary factors which results in sharpening or flattening relating to phonation.

Table 2. 2 Summary of the Factors that Cause Sharpening and Flattening
Relating to Phonation

	Causes sharpening	**Causes flattening**
Breath support	Too much intensity or breath pressure	Too little intensity or breath pressure
Onset	Too much intensity in onset or the onset is forced	Too little intensity in onset or the onset is weak
Register	Insufficient control while singing in upper range	Inadequate flexibility (too heavy or rigid)—too much chest voice
Vowel	Bright or forward vowels	Dark or covered vowels
Vibrato	Too much vibrato	Too little vibrato
Melody	When ascending intervals are not made sufficiently large	When descending intervals are not made sufficiently small, or when the repeated and sustained notes are given insufficient intensity or support

In spite of the complexities of the factors affecting accurate intonation, choral directors believe that these problems can be corrected in a variety of ways. To heighten a singer's awareness is certainly the fundamental and the most essential task (this has been discussed). Furthermore, establishing a correct phonation method and a healthy voice are also recommended by most of the experts.

Among these factors shown above, pitch accuracy and intonation in melodic progression was most frequently discussed by numbers of voice teachers and directors. One purpose of the current study is to improve intonation through vocal exercises, therefore, the treatment of melodic material is focused on here.

Flat singing in a descending scale has been repeatedly mentioned by the teacher/director and it is said to occur most frequently. The possible reasons for this are energy loss, little breath control or over-relaxing (Lupica, 1996; Ware, 1998). Therefore, numerous experts strongly suggest making the descending intervals sufficiently small (Kaplan, 1985; Grant, 1987; Tamte-Horan, 1989). In contrast, ascending scales often tend to be too sharp. Some authors attribute this sharpening to factors such as excessive physical tension and strain on the vocal cords (Kaplan, 1985; McKinney, 1994). Thus, Kaplan (1985), Grant (1987), Tamte-Horan (1989) and Wang (1992) suggest making the ascending intervals 'large'. Wang (1992) gave a good example of describe how to sing a high note. She proposed that singing a high note is like a tree: the higher the tree grows, the deeper the roots extend. Similarly, McKinney (1994) also suggested that the higher the note, the more energy, space and depth are required.

Techniques to prevent sharpening and flattening include verbal instruction or reminding: when you sing high, think low; when singing low think high (Wang, 1992; Ware, 1998).

Imagination is also apparently highly effective. When singing a descending or repeated pattern, imagining something rising is supposed to assist. Conversely, when singing an ascending pattern, it seems that imagining walking on a piece of thin ice helps, so you have to make steps small and take great care (Apfelstadt, 1985; Grant, 1987). Finally, a powerful way to prevent or correct sharpening or flattening is to use a gesture.

Gestures for improving intonation

Generally speaking, a gesture can serve several purposes. For instance, a simple circular hand gesture can be used to improve intonation, enhance flow, encourage an open throat and lift the soft palate. The fundamental components of gesture are fingers, hands, lower and full arm (one or both hands) with central body engagement (Chagnon, 2001). The basic types of gesture used as a pedagogical tool are:

1. Stretching and reaching (e.g. pushing, pulling, sweeping),

2. Swinging and swaying,

3. Circular gestures (e.g. circling, rotating, stirring),

4. Direct throwing gestures (e.g. throwing, pointing, darting, lifting, picking),

5. Flicking gestures,

6. Dabbing and punching,

7. Mirroring or Emblems (e.g. opening and closing hands to mirror the shape of vowels).

Choral conductors use a specific gesture to correct vocal fault or improve choral quality depending on different contexts. Hibbard (1994) concluded:

> ...it was not always possible to identify the definitive instructional purpose of every movement observed. Their range of purpose is perhaps their pedagogical strength (Hibbard, 1994:267).

In spite of this complexity and difficulty, the following list attempts to identify specific gestures, which are found to be efficient in improving intonation. This arrangement is primarily based on reviewing literature from dissertations by Wis (1993), Hibbard (1994), Aylen (1998), Chagnon (2001); choral or singing books Rao (1993), Phillips (1992), Ware (1998); journal articles by Apfelstadt (1985), Hylton (1987), Grant (1987), Chivington (1998) and the researcher's own private lessons followed by Eurhythmics expert, Greenhead.

The majority of gestures for intonation are used to prevent flatness or sharpness of pitch. The treatment is based on the principle of "thinking up while singing descending" and "thinking down while singing ascending". In order to establish a correct physical sensation, the discipline of "the higher the note, the more space, energy, and depth needed" and "the lower the note, the less space, energy, and depth needed" is suggested. Basically, slightly bending the knees (lengthening the spine, releasing the lower back and general tension) or standing on one leg (centering and balancing the body and releasing the lower back) is recommended (Apfelstadt, 1985; Grant, 1987; Greenhead, 2000) for high notes. In addition, shaking the hands while singing high notes is also suggested for releasing tension, displacing of tension and stopping gripping, especially that which causes sharpening problems (Wis, 1999, Greenhead, 2002).

Table 2.3 lists the gestures commonly used in treating melodic patterns according to previous studies.

Table 2.3 A Summary of Gesture Commonly Used in the
Treatment of Poor Intonation in Melodic Patterns

Pattern	General faults	Physical sensation (motor image)	Gesture and description
Repetition or small steps	(1)Vague intonation (2) Flattening	Circular motion	Two-handed circling gesture Karate chopping
Descending	(1) Flattening (2) Insufficient support of last note	Raising motion Weight transition	Simply raising hand (palms up) or point upwards Pulling upward on an "elastic" Picking up an imaginary object Moving the body in the opposite direction of the pitch Sitting position shifts to standing position Begin with bending knees. As the scale is sung, slowly extend the legs to a normal position and lift the arms up.
Ascending	(1) Sharpening (2) Muscle tension (3) Vocal strain on high notes	Falling motion Weight transition	A pointing motion—the index fingers of both hands alternated, note by note, in an upward pointing motion. Move the body in the opposite direction of the pitch Bending knees while singing high notes Shift standing to bending knees to squatting, pushing hands out as the scale is sung
Up and down	(1) Vague intonation (2) Unable to extend the vocal lines	Circular motion Swinging	Circular arm swings— begin with the hands dropped in front of the body, swing them symmetrically out and up in a circular motion. Moving hand and forearm smoothly in (low pitches) and out (high pitches) in synchronization with the rising and falling pitches. Bend knees to collect something with a horizontal circle Putting hands in front of the body and sweeping one hand before the body for ascending and then slowly sweeping to the front for descending (eye focuses on middle finger) Forward swinging or swaying Side to side swinging
Sliding (big jump)	(1) Sharpening (2) Muscle tension (3) Vocal strain on top notes	Stretching motion Swinging	Interlaced fingers in a relax position in front of the chest for low notes, pushing hands down for sliding upwards See above (for up and down)

Note: Details of gesture description see Hibbard (1994), Wis (1993;1999) and Chagnon (2001), Appendix B, C, E or VCD track A, B, D.

2.3.3   Tone Quality

Some authors used the terms "tone quality", "vocal quality", "tone colour", "resonance", "timbre", "tone control" or "tone" to label the quality of tone (Tamte-Horan, 1989; Ford, 1999). "Tone" and "choral tone" are frequently used in choral singing but often interchangeably with "tone quality", but the difference of tone quality between solo and choral singing is not well identified.

Vocal sound is often described as bright, dark, thin, rich, ringing, warm or sweet. The ideal tone quality is round, full, free, rich and vital, and the highest quality is a ringing sound (Christy, 1983; Shui, 1992; McKinney, 1994; Thurman et al., 1997). Shui (1992) states that although the child's physical and physiological status is not as mature as an adult's, the natural, bright, transparent, clear and pure characteristics of children's tone quality are to be treasured. Lamb (1988:147) stated that "an ideal choral tone is one that is pleasant to listen to, is capable of a ringing forte, is equally as capable of an intense pianissimo, and is warm and vibrant". Compared to intonation, tone quality is less discussed, especially in relation to children's tone quality. It may be because the ideal of tone quality is quite subjective, varying from person to person (Ware, 1998), but most experts agree that the important characteristics of good vocal tone are:

1. Freely produced

2. Pleasant to listen to

3. Loud enough to be heard easily

4. Rich, ringing, and resonant

5. Energy flows smoothly from note to note

6. Consistently produced

7. Vibrant, dynamic, and alive

8. Flexibly expressive (McKinney, 1994:77)

Some writers support a tonal concept that varies with the historical time period of the

musical composition. Examples are shown as below table (Table 2.4).

Table 2. 4 Tone Quality Requirements in Different Musical Periods

Period	Tone quality requirements
Renaissance	Clear but not necessary vibrato-free, a transparent sound, little vibrato
Baroque	Clear, vibrato-free, agile, relatively thin
Classical	Lyric, buoyant, light with minimal vibrato, contain precise and clear vocal lines
Romantic	Relatively more weight, a richer tone with more vibrato, lush lines
Contemporary	A controlled sound can maintain consistent crescendi and descrescendi, clear lines

Note: summary from Ford, 1999: 9-10.

Hylton (1987) and Yang (1994) confirmed this and stated that a choral tone should vary

according to different style and period of works. Among the five characteristics of

choral music performance (tone quality, diction, blend and balance, intonation and

precision), Tamte-Horan (1989:56) regarded "tone quality" as the most important one

because "it constituted the largest amount of information of any single characteristic".

He discussed tone quality systematically in terms of proper phonation and good

resonance and identified a good tone quality as being dependent on (1) a clear and

pleasant basic vocal quality; (2) adequate and sustained intensity; (3) a clear, pleasant

and adequately intense attack; (4) sufficient flexibility and control, and (5) controlled

vibrato. From this point of view, it seems that tone quality almost covers all aspects of

physical processes (breathing, phonation, registration and resonance). It was believed

that every component has a specific vocal technique to achieve it and a solution for

correcting vocal faults, although they are all interrelated. The following section will

discuss the major problems relating to tone quality and suggest some techniques for

enhancing vocal efficiency.

Breathing and Phonation

Breath support

The purpose of breath support is "to supply adequate breath pressure to the vocal folds for the sustaining of any desired pitch or dynamic level (McKinney, 1994:53)." Tamte-Horan (1989) stated that an adequate and sustained intensity is dependent upon adequate breath pressure, commonly referred to as "breath support". Too little breath pressure or support and the voice production sounds weak and lifeless or 'sheep-like', whereas too much breath pressure or support and the sound is typically forced and strident (Tamte-Horan, 1989; Phillips, 1992; Suen, 1994; McKinney, 1994).

Breath control

McKinney (1994) defined breath control as a relationship between the breath and the vocal folds and this decides how long you can sustain a phrase in one breath. According to Tamte-Horan (1989), a clear and pleasant basic vocal quality requires efficient breath pressure and a balanced vocal-fold tension. Excessive vocal-fold tension (hyperfunctional phonation) in relation to breath pressure results in a harsh, edgy, or strained tone, whilst a breathy or fuzzy tone results from too little breath pressure in relation to vocal fold tension (Christy, 1983; Tamte-Horan, 1989; Suen, 1994; Ware, 1998).

Phillips (1992) stressed the importance of balance in the tension of the vocal folds with the flow of the energized air column. According to him, the children who received the instruction to breathe from the diaphragm improved in their singing. Chivington (1998) suggested yawn-sigh—yawning on "ah" from high to low in the range – as a way of releasing tension.

Registration

Saathoff (1995) defined registration as that:

> "...which is the change in timbre or quality of the voice according to different pitch levels. These different areas of similar quality or timbre are called registers (Saathoff, 1995:76)."

In order to make the transition from note to note or register to register successful, even, and secure, sufficient flexibility and control are important. Insufficient flexibility and control will result in rigid vocal production and the notes will be insecure (Tamte-Horan, 1989). Several studies have shown that chest-voice singing could be potentially damaging to children's voices. As mentioned previously, developing head-voice is regarded as crucial. Therefore, Phillips (1992) stressed the importance of downward vocalises—from the upper register moving downward into middle register for children. Soft singing is suggested because loud singing can result in chest singing which is vocally harmful for the young students.

Vibrato

The average vocal pitch vibrato is between five to eight times per second (McKinney, 1994; Ware, 1998). Without vibrancy, vocal pitch it is out of focus and forced in production (Christy, 1983). In order to achieve an even vocal line, a balanced vibrato is important. The excessively slow or wide vibrato results in a "wobble" or "ocean wave", whereas if the vibrato is too fast and too narrow, the sound results in what is called a "flutter", "bleat" or "tremolo" (Tamte-Horan, 1989; Bunch, 1993; McKinney, 1994; Ware, 1998). McKinney (1994) believed that balanced support and released tension are fundamental to correcting vibrato problems.

The techniques of placement and focus, used interchangeably, are efficient means of

experiencing vibratory sensations. Ware (1998:152) said if "the tone placement is right, then the vocal folds vibrate efficiently". This author stressed that the tone placement must be concentrated primarily on head sensations. Most great singers and voice teachers also use the concept of "singing in the mask". That is, being consciously aware of and concentrating the air press into the vibrators in the nose, forehead and cheek areas.

Resonance

A full, rich, deep and balanced tone is dependent upon a sufficiently and consistently sonorous resonance. An adequate and balanced resonance "creates in the singer an illusion of singing above the throat and high in the soft palate (head), as if one sang without any throat at all (Christy, 1983:67)". In singing, "space" refers to the feeling of the open throat and the sensation of nothingness or noninterference in the throat and neck. Daniel (1993) and Hemsley (1998) believed this kind of sensation can develop a depth, richness and maturity in a voice. The primary fault of resonance is insufficient space, especially for young children or untrained singers. Therefore, an open throat should be the primary origin of resonance.

If the space is reduced, this will result in a tight, hard, and pressed sound (McKinney, 1994). If the resonance is insufficiently sonorous, the voice will lose its round and bright nature and result in a nasal sound (Tamte-Horan, 1989; Shuen, 1994; McKinney, 1994).

For children, it might be very difficult to understand much about resonance. Therefore, encouraging space should not be neglected. The most popular ways for achieving spacious sound in children seem to be to ask them to begin with a yawning position. Other suggestions like mental images (for instance, imaging the back of your throat is a

big cave) and vocal imagery (likewise) are also effective, especially for children. Several writers reported a five-note major descending scale pattern by using different vowels and humming (consonant "m" or "ng") to encourage an open throat (Daneil, 1993; Lupica, 1996; Ware, 1998). Lupica (1996) stated that the consonant [n] is ideal for nasal resonance and [ng] for head resonance. Shui (1992) suggested emphasising the development of nasal resonance from the beginning. Once children are familiar with nasal resonance, it will be easier for them to achieve head or other resonances. However, the development of children's head-singing was recommended by almost every children's choral director. In addition, the technique of gesture is also mentioned as being effective, which will be discussed below.

Gestures for improving Tone Quality

Unlike intonation, the majority of gestures designed for improving tone quality vary primarily depending on when the problems occur. Although a certain number of different gestures are used for establishing a good tone quality, several common methods are observed which are drawn from previous studies as below:

(1) Developing a sensation of different qualities of sound

- Variations of clapping in different directions, weight or dynamics.

- Holding arms like holding a beach ball (rounder, fuller), tennis ball (more focused) and paper clip (more pointed).

- Variations in sizes of circling by using index finger, hand, then arm.

(2) Breathing--sustaining energy, phrasing emphasis

- To sing with supported tone – a spiral gesture, a football pass, a Frisbee toss,

(3) Phonation

- To achieve clarity on entrances—a dart throw
- To create clarity of releasing—a flicking motion

- To remind singers to lift soft-palate—a hand signal (arched palm down, cupped by side of head above ear)

(4) Resonance

- To prevent a dead tone—directional pointing, rotating fingers
- To focus tone and move forward—a dart throw, arms cross and press, a spiral gesture, directional pointing
- To project the sound—a football pass, throwing gestures, a Frisbee toss
- To create energy in the sound—a spiral gesture, throwing gestures, a Frisbee toss, arms cross and press, circling, stirring, and karate chopping
- To create a relaxed space for desired shapes of vowels—hands-on-cheeks, small circles of hands
- To model the tongue position for vowels—a turn of 90° into clapping hand.

For further details of gesture description see Aylen (1998); Hibbard (1994), Wis (1993; 1999), Chagnon (2001) and Appendix B & E or VCD track A & D.

2.4 Developing Movement Skills—Dalcroze Eurhythmics

Physical exercises are essential preparation for choral work involving movement because the movement sensations have to be experienced and internalised so that the students can then apply the motor images and sensations to their singing. During this phase the muscles and muscle memory are being stimulated. The movement training programmes in this current study were designed for improving the quality of motor images. The work of Jaques-Dalcroze as the stimulus was selected because it was believed to be the most efficient method of training muscular sensitivity and body awareness (see Aronoff who discusses many approaches to movement training in her 1983 text, concluding that Eurhythmics is the best). Therefore, the issue of using Eurhythmics for choral movement preparation will now be discussed.

2.4.1 A Brief Biography of Emile Jaques-Dalcroze

Emile Jaques-Dalcroze (1865-1950) was a Swiss composer, conductor, and music educator. When he was 27 years old, he taught harmony and solfège at the Conservatory of Music in Geneva. In the class, he noticed that his students could not hear the harmonies they were writing. This led him to think about the importance of coordination between eyes, ears, mind and body. Thus he began to devise a programme for ear-training to sharpen students' perception. Further, he observed the students' performance and soon discovered that although technically advanced students, their performances were mechanical and less musical. He realised that the students understood music only in an intellectual way because they were not able to feel and express music. Therefore, Jaques-Dalcroze spent the rest of his life helping his students develop their ability "to hear, feel, invent, sense and imagine, connect, remember, read and write, perform and interpret music (Choksy, et al., 1986:27)." He realised that the first musical instrument needing to be trained is the body. Therefore, he encouraged his students to use their gestures, arms and body to express and feel the music. This kind of teaching approach is now popularly adapted in music education called "Eurhythmics", which is a method to study and experience musical elements through movement.

The Dalcroze Eurhythmics is based on the premise that rhythm may be found in the natural rhythms of the human body (Choksy, et al., 1986:27). There are three branches of this method: Rhythmics, solfège and improvisation. Rhythmics explores the time-space-energy relationship of body movements; solfège emphasises pitch training and harmony; and improvisation is concerned with manipulating the musical elements, especially at the keyboard. The Jaques-Dalcroze method has been proved to be a very powerful teaching method in facilitating students' music achievement and attitude. Nevertheless, the main purpose of this section is not to report the technique but rather

focus on discussing Dalcrozian principles and explore the reasons why the method is effective for developing an efficient body and improving a motor image.

2.4.2 The Principles of Eurhythmics

In general, Dalcroze teachers teach Eurhythmics based on the following principles:

(1) Developing an inner sense of music

The development of the inner aural sense, an inner muscular sense, and creative expression are the core of basic musicianship. Farber & Parker (1987) and Mead (1996) state that in order to develop an inner sense of music, students learn how Newtonian laws of time, space and energy control the physical relation to space and then internalise the laws, and relate them to the music.

(2) Coordinating the ear, nervous and muscular systems, and the mind.

Dalcroze recognises that it is insufficient for musicians to develop only their inner sense of muscular capability. He realised that there should be some system of rapid communication between the brain and the muscles, and thus the body and mind must work together in all things (cited in Choksy, et al., 1986). Therefore, developing a sharper communication and better co-ordination between the ear, body, brain and mind became a core purpose in Eurhythmics lessons (Findlay, 1971; Choksy, et al., 1986; Wilson, 1988; Mead, 1994 &1996; Caldwell, 1995). Greenhead (2002) maintains that we need nerves and muscles capable of responding to the promptings of the mind: nerves which transmit the message to the muscles faithfully and efficiently; muscles of sufficient strength, speed and flexibility to respond appropriately. She continues to say that our mind will need feedback from these nerves and muscles on how we are doing. With this feedback, the mind can correct the image of movement and the message.

(3) Development of kinesthetic imagination and kinesthetic memory

Travelling through space with the whole body apparently helps students to develop kinesthetic imagination and kinesthetic (muscular) memory, which are regarded as a very important ability in learning music. According to Greenhead (2002), the memories of movements, and the qualities and sensations that we have experienced in the past, "motor images" can only be acquired through physical participation in experiences of action. It was believed that through Eurhythmics training, students stored a vocabulary of aural and kinesthetic images and feelings (muscular sensations) that could be translated into symbols, recalled and later internalised and performed at will (Findlay, 1971; Choksy, et al., 1986; Wilson, 1988; Bachmann, 1991; Mead, 1996; Labuta & Smith, 1997; Berger, 1999; Greenhead, 2002).

(4) Developing gross motor first and then fine motor

The body's larger muscles engage in gross physical movement such as walking, swaying, swinging, and running. By observing from her own teaching video and other Dalcroze teacher's work, Greenhead (1991) has stated that Eurhythmics followed a sequence structure to train the gross motor skills first (including the use of space, weight and gravity), and then the fine motor skills. The gross motor skills will transform into fine motor skills. She believed:

> ...this experience is then internalised and easily transferred to lips and fingers so that musical performance acquires rhythmical vitality as well as accuracy (Greenhead, 1991:16).

However, she further explained that this needs controlled research in a scientific manner in order to confirm this transference.

Similarly, Wilson (1988) also believed that Eurhythmics facilitated the transference of larger body movements (whole body) to the finer motor movements. Findlay (1971) also noted that the use of whole body involving the larger muscle groups has

a greater effect than using the fine muscles (e.g. the hands in clapping). In this sense, travelling through space with the whole body plays a vital role in developing the gross and fine motor skills.

2.4.3 The Application of Eurhythmics in Developing Movement Skills

Dalcroze (1967) noted that Eurhythmics itself involves physical training which deals with elements such as strength, flexibility, coordination and breathing. Although the principles of Eurhythmics can be applied to a rehearsal in many ways, Hylton (1987) stated that movement used in a warm-up session could be very powerful. According to Aronoff (1983), Eurhythmics serves as a very good programme for developing muscular skills because its method is unique and different from other movement training or exercise.

Firstly, Dalcroze Eurhythmics involves whole body movement. Dalcroze teachers, most of the time, improvise the music on the piano by changing dynamics, meter, speed, quality of sound, and articulation, so the students are trained to respond quickly and also more accurately through the whole body. Compared to A.T. (a static technique), Dalcroze tends to be more active and concerned with flow.

Secondly, Dalcroze's physical training is active, rich, challenging and interesting. Many physical training approaches focus on the functioning student's body by standing on a fixed spot, following the teacher's verbal directions. In the Dalcroze method, students learn to breathe, release their tension, and relaxation with the whole body moving by using space with teacher's piano or voice accompaniment. Dalcroze Eurhythmics classes always begin with a physical warm up which allows students' feet and hands to explore time, space and energy around the room, and transfer their weight. Furthermore,

all the exercises were designed as games to challenge the students to hear better, feel more, and coordinate their physical movements in order to respond better to the music (Findlay, 1971; Greenhead, 1992; Caldwell, 1995). As a result, students become active and it seems then that they enjoy the music making more.

Thirdly, Eurhythmics takes "imagination" into action. Imagination is considered an effective technique in singing. For example: imagine your voice is like an elastic line. Apfelstadt (1985) agreed this is a helpful technique but it is insufficient because the singers do not understand the idea completely. Dalcroze teachers believe all the musical concepts or skills can only be more deeply understood and memory of sensations can be activated when there is physical experience.

Fourthly, Eurhythmics is not only accurate but also artistic. That is as Caldwell (1995) stressed, even technical exercises can be musical. Dalcroze believed that music and body must work together without separation from an earlier music learning stage, working on expressive as well as technical elements; a more aware, sensitive and musical body is thus developed.

Finally, Eurhythmics enhances singers' recognition of a conducting gesture. In a choral context, Hoffer (1993) believed that students learn a "grammar of gestures" in a way similar to that of a conductor through movement by using their gestures and conducting. Dickson (1992) and McCoy (1994) attempted to focus on the connection of the body and conducting gestures by using Eurhythmics. Dickson (1992:17) believed that "the more sensitive the students become to their bodies, the more acute their awareness that their bodies are both the medium and the message." Therefore, gesture quality should be enhanced and the conducting techniques should also be more effective and expressive.

To sum up, Dalcroze movement training can result not only in an efficient body but also in good alignment, centredness, balance and coordination and also in a musical and expressive body. In the current study, the movement training programme in practice sessions was mainly based on Eurhythmics to foster the kinesthetic experience and enhance singer's gesture quality (the class programme examples can be seen in Appendix C).

Summary of this chapter

This chapter has examined the existing literature related to use of gesture and movement as a teaching strategy and vocal aid in choral training. It has shown that several music psychologists have explored the strong link between musical sound and bodily movement. Gestures are not only a part of the performing arts to express emotions but also facilitate singing skills for stage singers. The way a gesture is demonstrated to choral singers may affect their choral tone. The direct link of this close relationship can be observed in conducting gestures. Finding strong theoretical and practical associations between voice and gesture in the literature seems to support the premise that gesture could be a very useful tool to aid singing.

The literature has revealed that movement activities can enhance choral quality including musical understanding, rhythm, expression, and vocal skills. Yet, the main focus of the existing studies was on developing musical concepts rather than improving vocal skills. The method of movement is often only used as an implemental tool, and has lacked a systematic study to explore a more in-depth discussion on the effectiveness of this kind of technique. In the last decade innovative choral educators such as Wis, Hibbard, Aylen and Chagnon have summarised, categorised, and analysed several gestures and movement activities used by many expert choral directors. Their studies

have examined the effectiveness of gesture and movement in choral singing, this now provides a more systematic categorisation of specific gestures for specific vocal goals and their use. But again focused empirical studies drawing on quantifiable outcomes have been lacking.

For rehearsal efficiency, Wis, Hibbard, Aylen and Chagnon describe the advantages of using gestures, e.g., improving singers' concentration and group dynamics, saving rehearsal time, creating an active choral environment and a positive rehearsal atmosphere. For singers and directors, the use of gesture has also described to be of benefit, e.g., it is easy to establish a common language between singers and directors as gesture provides visual assessment for conductors and makes the singing easier. The philosophical principles for the application of movement in choral singing have been summarised as follows: (1) gesture conveys what words cannot; (2) kinaesthetic experience facilitates learning, (3) gesture promotes musical memory; and (4) gesture as a metaphor aids music learning. It is believed that something experienced in the body, through a gesture or movement, can be stored in the memory and internalised so that it can be drawn upon at a later time to recall the physical sensations without the individual actually having to make the gesture.

Obviously, the work of Wis, Hibbard, Aylen and Chagnon mentioned above has provided insight into the clarification of some gestures and movement for particular vocal techniques, but fewer specific sources exist examining the theoretical basis of gesture design. Whether the effectiveness of gestures is applicable to every singing group is unclear due to a lack of empirical evidence. Furthermore, little evidence is available to examine the gesture training techniques and the problems of using gestures. Although the use of gestures in warm-up sessions has been debated, the research

focuses on the application of movement in the whole rehearsal process (warm-up sessions and literacy) rather than a particular part. During a practice session, 'vocalisations' are regarded as an important tool to develop a new singing voice, but the specific gestures for the specific vocal patterns have been less explored. This has led the current author to direct the empirical work in the present thesis towards exploring the effectiveness of specific gestures when training students in vocal exercise sessions.

The four studies discussed above were also based on older students, and the possibility of using movement techniques in choral singing for children's choirs has not been developed in their discussion. Therefore, the current study focuses on children's choirs in the vocal exercise sessions, in order to specify how particular vocal patterns can be matched with particular gestures to enhance children's motor images, making singing easier. In addition to quantitative measures of achievement according to the training programme undertaken, further qualitative research was carried out to gain more information about how children used gesture in singing.

The concept of movement in choral education is not precisely defined. It can mean movement activity, movement training, movement games or gestures. In order to develop an effective teaching technique, the difference between movement and gesture, and their roles in singing needed to be identified. Without a clear discrimination of their use, it might be difficult to clarify the functions of gesture and movement in developing singing voice or training muscular sensitivity. Thus in this thesis, gesture techniques are used as a means to aid singing, whereas Dalcrozian movement training is used as a movement preparation to develop muscular sensitivity and to create a clear motor image for particular vocal patterns.

This chapter has shown that gesture, as a technique, improves vocal skills and facilitates singers' choral learning by examining the theoretical and philosophical basis and reviewing empirical works. Practically, exploration of the link between voice and movement/gesture, and how children master this style of technique will be undertaken through observation and interview work. A systematic approach to vocalisation by using gesture technique to facilitate children's singing techniques in learning choral music will be attempted, and the role of movement training in singing and effective gestures will be explored in the following chapters, developing the practical work.

CHAPTER 3

PILOT STUDY: INTERVIEW AND OBSERVATION

According to previous empirical research, no specific attention has been paid to how children work with gesture in the choral situation. The aim of this current research was to explore the feasibility of using this kind of technique for a beginner children's choir. Because of the lack of information about children in this context, a pilot study was conducted to collect more information about work on voice and gesture.

3.1 Method

Initially, it was important to develop teaching approaches and to assess their effectiveness. Thus, in order for the researcher to develop teaching strategies for using gesture and movement in choral training for children's choirs, semi-structured interviews were selected as the method for this pilot study. Five Chinese children of either ten or eleven years old, were randomly selected to take part in the study. Only one of these individuals did not have experience in learning an instrument. All of them had a positive attitude towards music but no special training in singing, movement, dance or gymnastics.

The interviews all took place in the Music Department of Sheffield University. In order to observe interviewees' gestures and movement, video and audio recordings were made of the interviews. Drinks and chocolates were offered as rewards during two short breaks necessary to prevent the children from tiring or from getting a dry throat. The children showed they were not fearful of performing in front of the video camera. The open style of the interview allowed the children to express their experience of using gesture techniques and to create their gestures and movement. In addition, they were

asked to show some gestures for particular sounds.

Each interview took approximately one hour, including two short breaks (during which time the interviewer could reflect on the proceedings for discussion with the children). The interview was divided into four sections: (a) musical background, movement experiences including, (b) mirror, (c) shadow, and (d) vocal pattern (see the interview plan in Appendix A). In order to get the overall picture of the children's musical background, the children gave an account of their musical experiences and preferences. A Dalcrozian mirror exercise was chosen for the physical warm-up and for the observation of the relation between voice and gesture. The children were asked to copy the movement and later the voice of the experimenter who also acted as the teacher/leader. Subsequently, the children were asked to create their own gestures and to vocalize a sound for the interviewer to copy. Through the mirroring game, subtle gestures and sounds were explored.

In addition, the relation of the children's movement and voice was observed through a Dalcrozian shadowing game. In the beginning, the children were asked to follow the interviewer's movements (travelling in space) and then imitate the voice. Afterwards, they were asked to explore their own movements and voice. The children were asked to discuss what they did.

The interview also incorporated ten popular vocal warm-up patterns (Appendix B), which are common vocal exercises in rehearsals, and all were given by the interviewer. The children described the patterns by using gestures and then applied them to singing. The suggested gestures were given in order to establish which gesture the children found was best and to explore their accounts for why it was most effective.

The videotapes were then analysed under the following five sections:

Part 1: The mirror and shadow games, to explore how the children spontaneously worked with the voice through movement and gestures.

Part 2: Gesture and singing habits: to show the gesture and singing habits of the children as they were revealed during the interview.

Part 3: The link between voice and gesture, to show how the children perceive the relationships between voice and gesture.

Part 4: Gesture techniques, to show the special techniques needed for making an effective gesture.

Part 5: The effect of gesture, especially considering the functions and effects of common gestures. Also, common problems were explored.

3.2 Results

After the experimenter analysed and observed the movements and gestures, and the interview transcripts, the link between voice and gesture was explored.

3.2.1 The Mirror and Shadow Games

The main purpose of the mirror and shadow games in the interviews was to observe how the children accompany body movement and gesture with voice, and vice versa. When the children were asked to copy or follow movements, all of them could do this with ease. When they were asked to produce sound and movement/gesture together, their bodies often became rigid. Yet, when they were asked to be the leader, they produced very good sounds with appropriate accompanying movement.

The children differed in their opinions when asked if they thought of gesture/movement or voice first. In the mirroring game, children were asked to produce small movements (gestures) on the spot. Three of them said they thought about voice first and then gesture;

one of them said she thought about the gesture first before deciding which sound she was going to make; and one of them said: " I don't think anything. I just do it". In the shadowing game, they were asked to produce big movements using the space in the room and they all said they thought about movement first and then sound. Through observation, they performed and produced a better and more energetic sound when they moved through the space, especially when they experimented with their weight and gravitational pull. They all stated that they loved being able to move. Not only was movement enjoyable, but it also helped them to produce the desired sound:

It was easier to make sound when I was moving. (C3)

I love moving. It's easier to make the sound. (C5)

3.2.2. Gesture and Singing Habits

In the interviews, gestures used during speech were observed and applied to singing when a specific sound was required. For example, children were asked for a gesture to represent 'long' (gesture: open arms) and then this was applied in singing to help produce a long sound. Hand gestures commonly used by them in speech were reflected and used in singing. During the interviews, children tended to use two hands at the same time rather than one to describe the singing voice.

It was uncompleted with just one hand, but it's easier to project something with two hands. (C4)

Two hands are better. Easier. (C2)

It is also seemed easier for the children to use open arm gestures rather than closed ones.

In addition to gesture habits, some singing habits were also observed. Firstly, the children looked down when they sang low and looked up when they sang high. Secondly, they tended to sing flat when performing descending passages. Thirdly, they always found it difficult to sustain the final note of an exercise. Fourthly, it was difficult for the children to copy more than three different syllables. Fifthly, it was difficult for the children to copy a vocal pattern with more than six notes. The last point is that the children tried to copy the voice first and thought about the gesture afterwards, even though they were asked to think about the gesture first without the voice. It was observed that sometimes the children could copy the voice well without using the gesture given by the interviewer.

3.2.3 The Link Between Voice and Gesture/Movement

All the children stated that there is a very strong relationship between gesture and voice. The following list shows the relationship between gesture and voice using movement and gesture analysis.

1. The level of hands reflected the height of pitch. For example: above the head (top) for high notes; for low notes children bent forwards to touch their toes.

2. The direction of hand moving reflected the melodic contour and emotional state. For example: pushing hands down for descending and sad; rising hands for ascending and happy.

3. The size of movement reflected the different dynamic levels. For example: bigger movement for louder voice; smaller movement for softer voice.

4. The distance of the palms of the hands reflected the tone quality. For example: clasped hands for a narrow sound; open arms and palms for a broad sound.

5. The continuity of movement reflected the articulation. For example: continuous and smooth movement for legato; discontinuous movement for staccato.

6. The weight of movement reflected the quality of sound. For example: heavy movement for dark and broad sound; light movement for light and ringing sound. Sometimes the children performed heavy or light movement by pretending to be animals. For instance, they moved like an elephant, which resulted in a heavy and loud sound.

3.2.4 Gesture Technique

Although gestures helped the children to sing better most of the time, not every gesture was successful in improving the voice or correcting vocal faults. Thus it seems that an effective gesture demands some prerequisites. From detailed observation, the following techniques were found to make a more effective gesture.

1. **Verbal imagery, direction and feedback**

    Sometimes, accompanying the gesture with verbal imagery will make it more effective, resulting in a better sound such as when the children were asked to make a gesture with verbal imagery. For example, imagine you are pulling a piece of elastic from a relaxed to a tight position. You have to imagine that the sound is inside the elastic which you must make as straight and as tense as possible. It helped the children to feel a sensation thus making the sound more vibrant. In addition to verbal imagery, giving some vocal directions (e.g. "Look at your hands, pulling away as slow as possible, keep the last note as long as possible as well.") and feedback (e.g. "Good! The voice goes straight and forward.") also produced better results because most of the children did not have an idea about what kind of sound they needed to produce. Through verbal imagery and directions, the children gained a clearer picture of the quality of sound they needed to make.

2. **Concentration and eye focus were requirements for certain gestures**

Some gestures improved the focus of tone, such as 'pointing' and 'pulling' which needed more concentration to undertake than 'swinging'. Therefore, looking at the hand gestures in order to focus on tone and even scales can help, especially for sustaining the last long note, which needs more concentration. From observation, most of the children could not sustain long notes because they were lacking good concentration or eye focus.

3. **The time-space of gesture with voice**

The gesture seemed not to be effective unless the time-space of the gesture and voice matched. Time-space here is defined as a correct match of the gesture length and pace and the exact note. For example, when singing the 1-8-1 sliding, 1 (fingers interlaced and palms facing down, placed in front of the chest-- relax)-8 (pushing hands down)-1 (back slowly) (see Figure 3.1 for correct and incorrect time-space, Appendix E and VCD track D), if the children made a movement that was pushing faster than their voice, it created a throaty vocal sound on the top note and constricted the sound of the last note. Generally, the children were unable to manage the sensation of stretching and sliding for the big jump. From observing the children, all of them had a habit of doing the gesture faster than their sound. It could be argued that their gesture therefore reflected their air status.
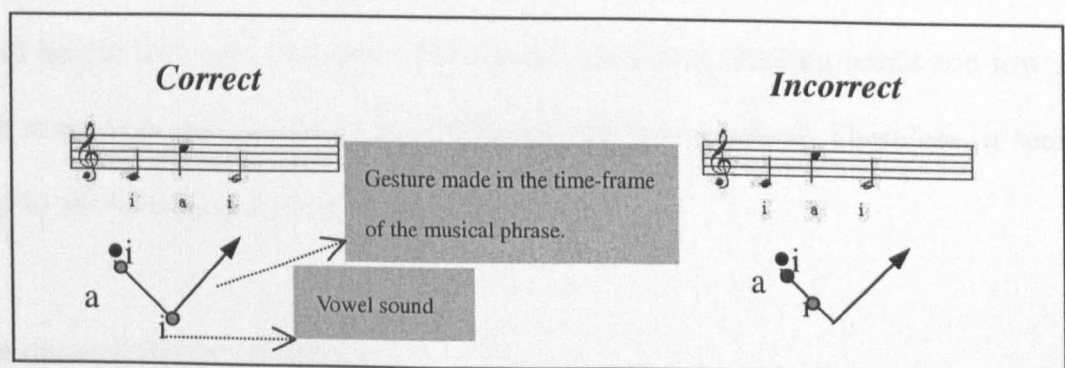
Figure 3.1   The Correct and Incorrect Time-space of Voice and Gesture for Octave Sliding

4. **The direction of hand gestures**

It appeared that tone quality depended on the shape of the hand gestures. An effective gesture depended on a correct direction of hand gesture. For example, 2.5 times circling for the vocal pattern of . The following graph (Figure 3.2) shows what is an effective and an ineffective gesture.
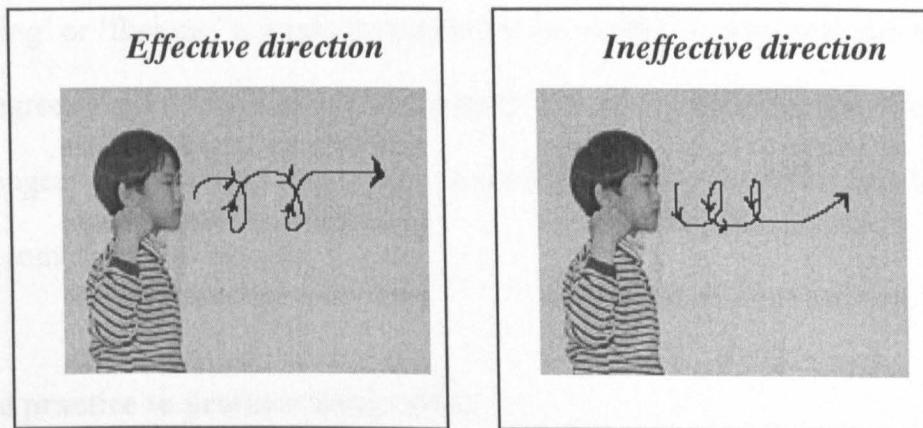
Figure 3.2 An Example of an Effective and an Ineffective Gesture Direction

Lifting the soft-palate is important at the onset of singing in order to produce an ideal sound. A clockwise movement created a comfortable, smooth and round sound. Conversely, a counterclockwise movement created a 'throaty' and constricted sound especially on the first notes.

5. **The placement of hand level at the onset**

Hand height was very important for a good beginning. Placing hands too low for high notes appeared here to give a 'throaty' and heavy sound. Therefore, it seems vital to show the performers where to start.

6. **The demonstration of gestures**

From the observation, the children were sometimes unable to copy the gestures

correctly, such as 'circling' and 'flicking', because the demonstrator did not show the gestures in an appropriate way (i.e., the reverse of the gesture she wanted the children to perform). As a result, the children drew the circle backwards instead of forwards. Therefore, when teachers demonstrate the gestures, it appears that they need to be careful. Some gestures such as 'pulling', 'pushing' or 'swinging' it might be the optimum position for the teacher to face the singers; in 'pointing', 'circling' or 'flicking' it might be better for the teacher to present to the singers at a 45 degrees angle. Alternatively, the teacher can demonstrate the gesture by facing the singers with a verbal instruction reminding them, e.g. 'draw a line forward' or 'pull something toward you'.

7. **More practice to produce better effect**

Gestures were not always effective at the beginning of examples and exercises. It was observed that children made a better sound through practising the gesture. In this sense, it seems necessary for teachers to correct singers' gestures in rehearsals.

8. **Expressive gesture causes expressive sound**

Only when the children were able to concentrate and experience the sensation of the gestures could their gestures become expressive. It was observed that the children performed better in voice and gesture and had a more expressive gesture when moving than standing on a spot. It might be that movement activities make them feel easy and thus more able to imagine something (for instance, imagine you are walking in a beautiful forest like a mouse) and, therefore, result in a more expressive voice and gesture.

3.2.5   Functions of Gesture in the Assistance of Children's Singing

The following section explores how gesture helped the children in their singing. The five children all stated that gesture helped them sing more confidently. In addition, they also found a difference between singing with and without gesture. Most of the time, they preferred using gesture and felt that gesture helped them, but at one point, one of the children said:

> *I think without gesture is better because I don't need to do two things at the same time. (C3)*

According to this point, there could be a potential difficulty of coordination on two tasks. All the children stated that gestures helped them to sing better during the interview. Generally speaking then, the results of the study suggest that the functions of gestures could be defined as being:

1. For focus

Gestures helped the children to focus on their tone when they looked at their hands:

> *Having something to look at helped me to focus on the sound. If I had something to look at, then I could focus better. I felt like I don't have a focus without gestures. (C3)*

It was observed that the most of gestures (e.g. circling, pulling, pointing) have the function of aiding children to focus on the tone.

2. For guidance

Gestures, as a guide, helped to direct the voice and helped with the shape or quality that was required:

The gesture is like a guide. It makes you sing straight or in a circle. I know how to sing with gesture because I taught myself how to sing. (C5)

It tells me what the sound should be like and what sound I need to make. (C1)

Without gesture, you have nothing. If you've got a gesture you can follow it. (C3)

One of the children described the gesture as his teacher. He said: "*with this gesture (bouncing), it helps me to sing. In other words, my body teaches me how to sing*".

3. For support

Gestures helped to give support to the children's tone especially for the final sustained note:

My hands give me support and tell me where to go. (C2)

If I do this (using a gesture as though pulling a piece of string in different directions-- up and down), it helps give me support so I can keep the last note longer. (C5)

With a "give you" gesture, I felt more supported. (C3)

4. For tuning

It was observed that gesture helped the children's pitch accuracy. A simple gesture such as circling or pointing had a very positive effect for sound projection and reaching the correct pitch. One of the children, unable to carry a tune most of the time (and at the age when his voice was changing), said that gesture helped him to reach the right notes and made his voice stable. He said:

...I don't know what's happened. When I use gestures, I can reach the tone. My throat is comfortable as well. (C2)

5. For sensation

Gestures gave the children physical sensations so they could make a better, more expressive sound:

> *Movement and gesture give the sensation of sound. When I lift my heels up and down, I will have the feeling of rhythm. (C3)*

> *It helps me to blend the voice and gives me a sensation. When they mix together, then I let them go. So when you sing, then it is easier to come out. It also helps with your expression. (C4)*

> *With gesture, I have some feeling of the sound. Without gesture, then there is no sensation. (C5)*

3.2.6 Common Problems of Using Gesture

Although all the children found that gesture helped them sing better, there were some common problems which made the gestures not as good as expected:

1. When the gesture stops, the sound stops.

Most of the time the children could not sustain the last note for long due to a lack of breath. As a result, they tended to stop their gesture suddenly. It was observed that when they stopped the gesture, their voice also stopped. Therefore, it seems that the interrelationship between gesture and sound is intimate. However, there is no concrete evidence in this study to demonstrate when and how gesture affects voice or vice versa.

2. When the children lose their balance or physical alignment, the sound wobbles or trembles.

From observing videos of the interviews, it was found that the quality of sound was affected by poor posture and gesture. Similarly, when making a sustained gesture a

lack of physical control caused the body to shake, the voice was also affected. When the posture was stable, then the sound was also stable and the scale became even. But when the children could not sustain the gesture smoothly, their voice wobbled.

3. Open gesture caused the sound to spread.

Children loved to describe the sound by placing their hands by their sides and moving them outwards. It could be observed when they did this that there was a very serious spreading and throaty sound.

3.2.7 Common Problems and Functions of Using Gestures in Vocal Patterns

Appendix B and VCD track A shows the best gestures used in different vocal patterns during the interview, which were arrived at after talking to the children and observing the video of their interviews. The problems and functions of the common gestures used by the children are shown in Table 3.1. According to this table, it can be concluded that every gesture has a number of functions.

Table 3.1   Common Problems and Functions of Using Gestures in Vocal Patterns

Gesture	Functions	Common problems
Knee bending (Pliés)	1. Releases muscle tension 2. Focuses the vocal tone 3. Gives the sensation of downward weight 4. Gives support 5. Improves the vital and energetic sound	1. Most of the children could not bend knees very well. 2. Their weight remained up, so the voice was not very focused. 3. They could not stand bending for longer than 5 seconds. 4. When bending, they tended to lift the body in the end.
Arm swinging	1. Gives a sense of sliding 2. Releases vocal and muscle tension 3. Lengthens back	1. All of the children stated they loved swinging because it felt comfortable. 2. Children could swing very well without using the voice. But their body tended to be very bound when they sang (1-5-1 or 1-8-1).
Pushing	1. Gives a sense of stretching and smooth tone 2. Focuses the tone	Most of the children could push down-up or out-in by crossing their hands very well.

Gesture	Functions	Common problems
Pulling	1. Tone focus 2. Evens out scales 3. Smoothes vocal line 4. Enhances the vocal quality when it needs to be light 5. Gives a sensation of elasticity 6. Prevents flattening when descending	1. When doing pulling up-down, all the children could not hold their balance. 2. They would pull diagonally instead of in a straight line.
Circling	1. Improves tone quality 2. Rounds sound, giving inner space 3. Tone focus 4. Smoothes vocal line 5. Supports	1. Most of the children could not draw a round circle. 2. It was not easy for them to copy the circling, especially in a vertical direction.
Flicking	1. Gives a sensation of lightness, releases tension 2. Cleans release	Most of the children had difficulties in copying this gesture.
Projecting	1. Confident and clean onset 2. Supports 3. Improves tone quality	Most of the children had no problems in copying this gesture.
Pointing	1. Tone focus 2. Supports	Most of the children could not keep their hand straight when pointing.

3.3 Summary of the Results

The following summary was drawn from this pilot study about the children's participation:

1. They loved moving when they made sound and performed better with movement or gesture.

2. They had a gesture habit of using two hands simultaneously.

3. The link between voice and gesture proved to be very intimate.

 (1) The level of hands reflected the height of pitch,

 (2) The direction of hand movement reflected the melodic contour and emotional state,

 (3) The size of movement reflected the different dynamic levels,

 (4) The distance of the palms of the hand reflected the tone quality,

 (5) The continuity of movement reflected the vocal articulation.

4. There were some techniques that made the gestures more effective and resulted in a better sound, including:

   (1) Verbal imagery, direction and feedback,

   (2) Concentration and eye focus,

   (3) Accurate time-space of gestures with voice,

   (4) Adequate and correct direction of hand gestures,

   (5) Correct placement of hand level from the onset,

   (6) Demonstration technique,

   (7) More practice produced a better effect,

   (8) Expressive gestures created an expressive voice.

5. All the children stated that they could sing better when they used gesture. The functions of gestures could be defined as being:

   (1) For focus,

   (2) For guidance,

   (3) For support,

   (4) For good intonation,

   (5) For sensation,

6. There were three common problems which impeded an effective gesture:

   (1) If the gesture stopped suddenly,

   (2) Loss of balance with resulting shaky gestures,

   (3) Open gestures.

7. Although gesture techniques helped the children to improve their vocal techniques and correct their vocal faults, the children had some difficulties in doing or coping with some gestures, such as bending, pulling, circling and flicking.

3.4 Discussion

The results of this pilot study suggest an intimate relationship between voice and gesture/movement and that children can use gesture to facilitate their singing. Thus, in order to achieve a more successful voice, gesture techniques could be used beneficially during practice.

Through observation, the children's body movement and gesture reflected the voice quality-- the size of movement reflects the different dynamic levels and the continuity of movement reflects the articulation. This is supported by Barker (1989) and Davidson (1991, 1993, 1994, 1995) who have proposed an intimate link between the type of musical sound and achieved the type of bodily movement used. The children, for instance, seemed to achieve a vigorous and lively sound more easily by travelling the whole space of the room. All the children preferred moving when they made sound. This is also discovered by McCoy (1986), Hibbard (1994) and Aylen (1998), indicating that movement activities enhance student's learning motivation and enjoyment in rehearsals.

It also emerged that the children sometimes produced a better sound when copying it from the interviewer. Music educators (e.g. Green, 1990; Tatem, 1990; Howle, 1992; Phillips 1992; Yarbrough, 1992; McKinney, 1994) have pointed out the importance of the vocal model in developing children's pitch accuracy. Not all of the music teachers or directors are good singers, therefore, it might not be very appropriate to provide a good vocal model. Furthermore, although they are good singers, their vibrato may be too strong and not always a good model for children. In this sense, Wis (1993) and Hibbard (1994) stress that one of the reasons why gesture is so effective is that it allows the musical meaning to be conveyed without any misinterpretation. Indeed, gesture

technique serves all three learning modalities: visual, aural and kinesthetic. Of course, gesture technique seems to be a highly personalised way to teach children how to sing. Although gesture technique has a positive effect in aiding singing and most children love to use it, not all of the children felt comfortable to use gesture while singing. This might be a challenge for teachers to overcome and has implications for the researcher here in developing the next stage of the current research.

Interestingly, the children, who used hand gestures in speech, repeated them when singing as well. It was observed that the children were able to use gesture in speech and signing to metaphorical ends. Findings from the interviews suggest that metaphor played an important role for the children in perceiving the sound especially for the melody contour and dynamics. For example, the children moved their hands from top to bottom when describing the descending passages. Obviously, metaphor has been discussed to be an important point in perceiving and creating music (Lakoff & Johnson, 1980; Wis, 1993; Cox, 1999; Swanwick, 1999; Snyder, 2000). Showing the pitch by gesture has been proved to improve student's melodic progression (Phillips, 1992; Mueller, 1993; Langness, 1997; Cox, 1999). Although metaphor helps children to understand abstract concepts (such as tone quality) and perceive pitch or melody more successfully, Greenhead (2000) argued that not all the gestures function as metaphor; furthermore, it may not always work well in developing sensations needed for vocal techniques. For example, the children in this study tended to describe a long note by opening arms—that is a metaphor. But the opening arms applied in singing often caused a serious spreading of the tone and throaty sound. According to earlier studies, moving the hands from top to bottom when descending easily causes flattening. In order to prevent flat singing, a correction gesture can be used. This gesture involves raising the hands which is unlike the metaphor of dropping hands downwards. In this case,

metaphorical technique does not always work at improving the vocal technique, but it did help children to understand the concepts of music such as dynamic, and melodic contour better. Langness (1997) also pointed out that when students use hand signals to indicate a high note by gesturing above their necks and heads, it often results in an inefficient raising of the larynx and squeezing of the vocal folds. Thus, in future work it might be important to develop pitch perception in the first stage of learning by adapting a highly metaphorical technique, but this may not be sufficient at a later stage for developing art singing. So, developing an appropriate gesture to usefully build on individuals' natural tendencies seems to be a very important first step.

The gesture habit observed of using two hands together is confirmed by Sabatine (1995:44) who states, "human beings are bipedal creatures and so they depend on a symmetrical shape". She and Benge (1996) strongly stress that a strong centre of gravity is essential for the balance of the body in singing. Children's motor development skill begins with two hands working symmetrically. Singing gestures are subtler than general movements, therefore they need more concentration and coordination. In short, two hands make a balanced stance easier and sound better. Therefore, working with children symmetry might be considered a good approach. Through observation, children tended to have a poor balance and centre of gravity and that caused a poor tone quality. According to Greenhead (2000), Eurhythmics stresses the importance of developing big muscles (big movement) first and then small ones (such as fingers). Furthermore, through whole body movement travel in space and the use of weight transference should develop good centredness, coordination and alignment.

The findings also showed that the children had difficulties doing some gestures such as bending and pointing. In addition, they were unable to sustain a gesture for a long time.

Greenhead (2000) feels that all such physical problems are due to poor co-ordination and balance. Again, she believed such problems can be rectified through movement training and that this would also improve vocal techniques. In this sense, it would seem that movement training could play a vital role in singing which should not be neglected when developing the voice. That is, movement involving travelling in addition to small-scale gesture training.

Previous studies focus on developing the functions of gesture in improving vocal sound. Nevertheless, the gesture techniques are less discussed and explored. It was observed that some specific gesture techniques were required in order to make a more successful voice during the interviews. Giving verbal imagery or verbal directions in an appropriate situation, the children could sing better. Wis (1993) has shown a positive result when using verbal imagery with gesture. According to Funk's (1982) findings, verbal imagery is an especially effective force when vocal skills are lacking. Furthermore, it might be necessary to provide some verbal guide (such as 'focus on your index finger') or feedback ('yes, keep the vocal focus') to accompany the verbal imagination because the beginner singer has a weak sense about what constitutes a good voice. This point is regarded as an important factor to achieve successful singing (Welch, 1985).

As Hibbard (1994) indicated, in order to make an effective gesture, every gesture needs to have a specific purpose. Therefore, the user needs to know the purpose of each gesture for a special sound or pattern. The main requirement of a gesture is that it is correct. And then the voice must blend with the gesture (coordination of gesture and voice). According to the interview findings, the time-space of gesture with vocals, the position of each note in the pitch progression, the direction of hand gestures, and the

effective voice by gesture. In Hibbard's (1994) study, she also found the importance of the direction of gesture, for instance an arm circle should be clockwise or counterclockwise. From her observation, she found that "outward circles (clockwise with the right arm) best produced the desired effect of releasing the lower tones and freeing the voice and body of tension while adding resonance (p.234)". Therefore, the gesture is not always naturally effective but needs some techniques. This indicated that the experimenter must explore her own gesture use and understanding as fully as possible prior to developing a further study.

Relatedly, three common problems of using gestures were discovered during the interviews. Most of the children could not sustain a long note because of a lack of air. And yet gestures can reflect how much air they have. In that sense, the training of gesture is the main approach to support breathing to create a better sound. According to Wis (1993), Hibbard (1994), Aylen (1998) and Chagnon (2001), gestures such as spiral gesture, football pass, Frisbee toss, and hold/lift pitch help support the tone. This also implies that gesture provides a visual assessment for conductor. Juntunen and Westerlund (2001) believe that through reading students' body movement, the teacher knows how the students feel and respond. The director can quickly evaluate individual's participation by judging their gestures, because gesture quality always reflects vocal quality which is visible (Wis, 1999).

From observation, the children's gestures became expressive after correction and practice. Like conducting gestures, singing gestures reflect vocal quality. The more expressive conducting gestures are, the better the singers perform. A conductor needs time and to have some training for their gestures to become meaningful and recognised by singers. According to Jaques-Dalcroze's music educational philosophy, through

Eurhythmics training the conductor's body becomes musical and hand gestures become expressive (Dickson, 1992; McCoy, 1994). Perhaps we can also infer that the children's gesture can become more expressive too.

According to feedback from the children, the gestures helped them in many ways. They helped to focus the tone, to guide the singing, to support the vocal line, to carry a better tone and to give a sensation of the sound. Ehmann (1968) believed the energy and intensity in a sustained chord or musical phrase could be relaxed in tonal intensity by means of a simple hand gesture.

Phillips (1992) stated that the problem among younger children is inattention or lack of focus. He believed a change in physical placement could provide the focus that the children needed for a better pitch concentration (p.25). There was a special case in this interview; one of the children could not carry a tune. Through gesture, he gradually produced the correct tune and even a better sound. Because he was at the age when his voice was changing it meant that his voice was not stable all the time. However, he managed to produce a stable sound by supporting it with gestures. In other words, the gesture seemed to give him a focus.

3.5 Conclusions

This pilot study has shown a strong link between voice and movement/gesture and makes a strong case to support the existing literature on the role of movement and gesture and its potential for training children to sing. It is very important that teachers know the purpose of each gesture for a particular sound when they are using this kind of gesture technique, so that the gesture can be effective. This is something that might be considered when developing a training programme for the main study. Through

interview analysis and observation during this pilot study, we can conclude that:

1. Gestures can facilitate vocal techniques if used appropriately.

2. Movement training plays a critical role in enhancing gesture quality and as a result causes a more expressive voice.

Although previous studies have shown a very positive effect of using gesture techniques in choral rehearsal, the effect for children's choirs has not been addressed. Furthermore, no one has focused on examining the effect of movement training in improving gesture quality. Therefore, further investigation is required, using a more expansive research method. In the following chapter, the main experiment of this thesis is described which tests the effect of gesture in promoting vocal techniques and the role of movement training in effective gesture.

CHAPTER 4

METHODOLOGY

The purpose of this study was to examine the effects of gesture and movement training for beginner children's choirs. In addition, the relationship of voice and gesture, and how gesture may help singing were also explored. The experimental procedure consisted of (1) selecting the singers; (2) pretest; (3) instruction; (4) mid-test; (5) instruction; (6) posttest and questionnaire; (7) performance evaluation; and (8) data analysis.

4. 1 Participants and Sampling

Fifty-three fifth-grade children (10-11 years old) from a primary school in Chungli, Taiwan participated in this study. Sample sizes by group are shown in Table 4.1. Seven students were eliminated as they transferred to other schools or classes, or had voice change problems, or failed to complete all of the testing.

Table 4.1   Sample Sizes by Group

	Group 1	Group 2	Group 3
Total numbers of students	20	20	20
Number without pretest score	0	0	0
Number without posttest score	3	2	2
Number of subjects whose data were used for this study	N = 17	N = 18	N = 18

To prevent some confounding variables during the experimental periods, existing school choral members and those who joined other out-of-school choirs were not considered for this study. For example, the majority of primary school choirs consist of sixth grade children in Taiwan. Therefore, sixth grade children were not used in the current study,

because they may have benefitted from their previous and on-going training in other choirs. Thus, fifth grade children were selected for the research, providing they had not been exposed to former training.

The procedures for selecting the singers were as follows:

Step 1: Access to a primary school (Shin-Jieh)

The researcher wrote letters to several primary schools in Chungli (one county of Taiwan) in May, 2000. Thereafter, one of them agreed to join and co-operate in the experiment in late July, 2000.

Step 2: Selected 6 classes at random

There were 12 x grade 5 classes (35 to 40 students per class) in this school. Because of the number of music teachers, school policy only allowed two classes to have music lessons at the same time in each grade, therefore, only 6 classes were chosen to participate in the experiment. However, they were randomly selected.

Step 3: Six classes were assigned to the three study groups randomly

Subsequently, these 6 classes were assigned 1 to control and 2 experimental groups randomly. Each group consisted of two classes.

Step 4: First singers selection

This study focuses on choral singing settings. Therefore, better singers were required. Twenty children in each class were recommended by their class teachers. In other words, 40 children were chosen for audition in each group.

Step 5: Audition for selecting singers

A total of 120 (40 x 3 groups) children participated in the audition. The children were asked to sing to the researcher and two female assistants who were university singers. Firstly, the children were asked to echo the researcher's or

assistants' tone on a descending major chord (5-3-1) on "ah" with three trials on low, medium and high pitches. Furthermore, they were asked to sing a familiar song. All the procedures were audio recorded. Having 40 children in each of the three groups who were completely unselected, it was decided to work only with the best 20 in each group in order to have more potential for improvement/understanding. This decision corresponds with idea that a better singer will achieve a better outcome and therefore get closer to producing optimal vocal effects. According to Rutkowski's *Singing Voice Development Measure* (SVDM) (1990), the children were at least initial-range singers (uses the singing voice, but rarely uses the speaking voice). Finally, 8 boys and 12 girls were selected for each group, this reflected the gender split in the classes.

4. 2 Experimental Design

The main purpose of this study was to examine the effects of gesture and movement training in vocal practice sessions. A pretest-posttest control-group design was initially considered to manipulate the independent variable of training technique. Table 4.2 shows the groups and treatments for the experimental design. It would not make sense to include a fourth group (with movement training but without gesture training) because movement training was designed for the purpose of enhancing gesture expression and supported gesture training (see research model on p. 87).

Table 4.2 Experimental Design

Groups Steps	Pretest	Treatments	Posttest
Control	Group 1	√	No gesture or movement training	√
	Group 2	√	Only gesture training	√
Experimental	Group 3	√	Gesture and movement training	√

Therefore, it was a "between-subjects design" with one independent variable Training Technique (TT) with three levels: "none" (TT 1), "gesture training alone" (TT 2), and "combination of gesture and movement training" (TT 3). Five dependent variables were measured: vocal technique—Intonation and Tone Quality; gesture quality—Body Efficiency, Mastery of Gesture Technique, and Coordination of Voice and Gesture.

4.3 Research Model

In order to develop an effective rehearsal technique, a research model of how gesture and movement training works in this main experiment is presented in Figure 4.1. Group 2 (TT 2) received the gesture training (left side), whereas group 3 (TT 3) received gesture and movement training (right side).

A clear and correct motor image of pitch is extremely crucial for singing especially for beginners (McKinney, 1994; Caldwell, 1995; Greenhead, 2002). Vocal patterns are most commonly used for vocalising. In vocal exercise sessions, if the singers practise the linking of voice and gesture (a gesture designed to match a specific vocal pattern to evoke the correct vocal sensations) through vocal pattern, it will form a motor image and is stored in the memory as a schema. Eventually, the singers will create a repertoire of technical skill through practice by linking the gestures with a variety of vocal patterns. If the singers encounter some difficulties, they will think about the repertoire of motor images and apply these to their singing. If the idea has been internalised, they will perform successfully without having to use gesture or only having to look at the conducting gesture. If the motor images have not been internalised, the singers need to go back and check what is missing in the gesture repertoire or repeat the gesture practice.
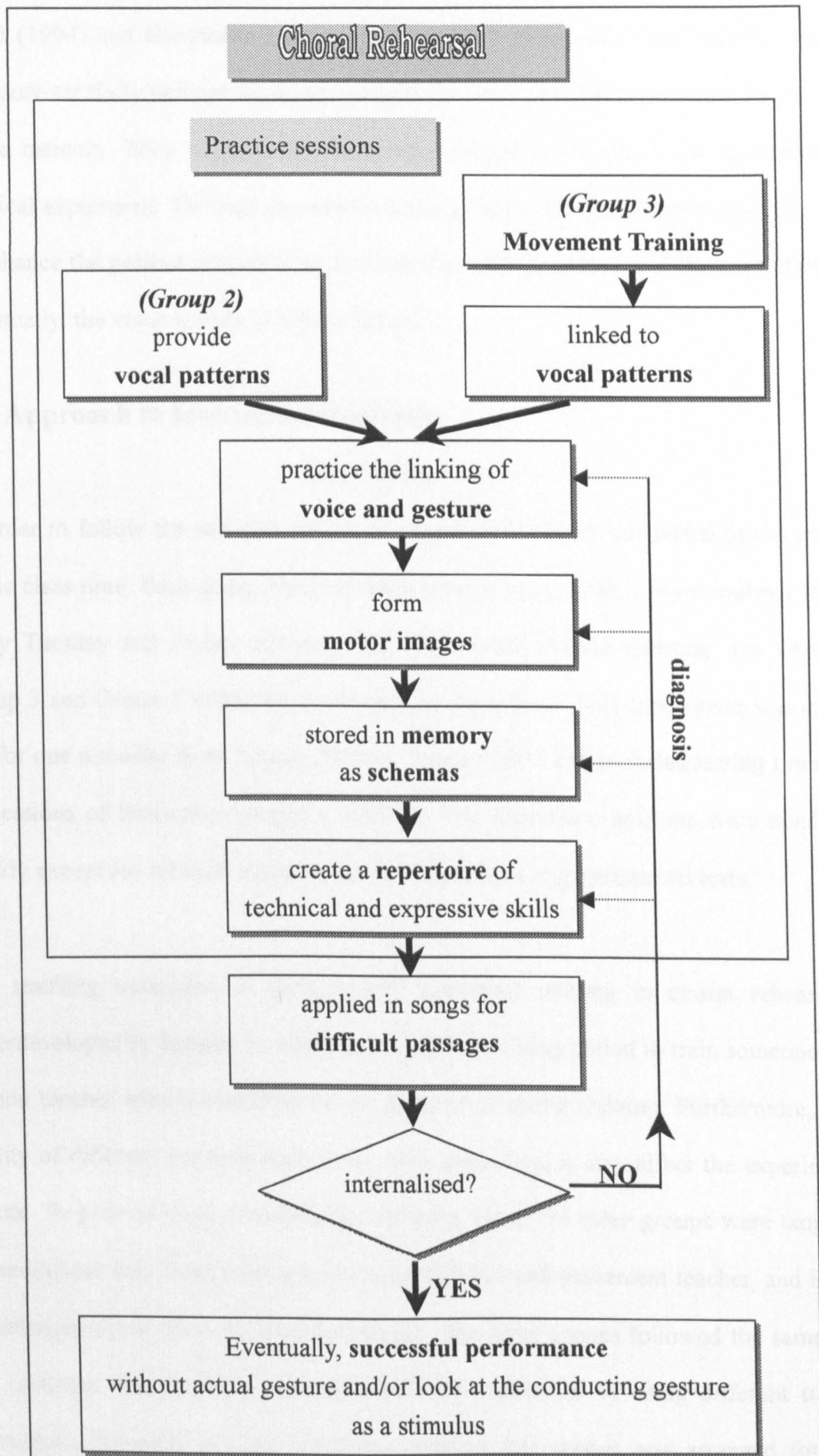
Figure 4.1   Research Model

Mead (1994) and Greenhead (2002), Eurhythmics experts, advocate that the stronger and more carefully defined the motor images, the longer and more precisely they remain in the memory. They suggest that movement training will deepen and strengthen the physical experience. Through movement training, every activity or exercise is designed to enhance the gesture sensation; as a result, the singing gesture will be more effective. Eventually, the voice quality is also enhanced.

4. 4 Approach to Instruction/Training
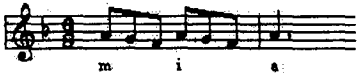
Class Arrangements

In order to follow the school's policy, the experiments were conducted in the general music class time. Each group received instruction twice a week, forty-minutes a lesson, every Tuesday and Friday morning. The class order for the morning was Group 2, Group 3 and Group 1 which were arranged by the school. This experiment was carried out for one semester from August 2000 to January 2001 and included testing times and 24 sessions of instruction (about 4 months). The instruction sessions were conducted weekly except for national holidays, school exam days or experimental tests.

The teaching technique of gesture and movement training in choral rehearsal is underdeveloped in Taiwan. In addition, it may take a long period to train someone to be a good teacher who is confident to use gestures in choral training. Furthermore, if the quality of different teaching style is not well controlled, it may affect the experimental results. To prevent these confounding variables, all of the three groups were taught by the researcher who is an experienced choral director and movement teacher, and is very experienced in all three teaching techniques. The three groups followed the same pace and contents. The practice sessions were fully controlled by using different training techniques. However, a music textbook used in this school was arranged for song singing activities after the vocal exercise sessions and the three groups received the

same treatment in this activity (no gesture and no movement). Attempts were made to reduce confounding variables by treating the groups as similarly as possible. Approximately one new exercise and gesture were introduced each session, with two or three other exercises and gestures being reviewed (class examples see Appendix C and VCD track C).

Table 4.3 Three Different Styles of Teaching in Three Groups

Vocal Pattern--   **Gesture**: (1) ear side hand circling and then extending one arm for last note   (2) hands and body swinging side to side
Group 1
Step 1: The teacher models the vocal pattern, and students echo.   Step 2: The teacher explains verbally and demonstrates "imagine your sound is running like a circle besides your ears...give space to each note...send your last note forward...focus on the tone and sustain it until the last moment".   Step 3: Students practise by following teacher's verbal explanations and demonstration repeatedly until the tone is accepted by the teacher.   Step 4: The teacher explains verbally and demonstrates "let your voice free.... imagine your voice is swinging beautifully from side to side"   Step 5: Same as step 3.
Group 2
Step 1: The teacher demonstrates how to sing the vocal pattern with gesture (gesture 1), and then students copy.   Step 2: The teacher explains the gesture techniques (such as timing, gesture size...). Students practise gestures and then practice along with singing.   Step 3: The teacher modifies and corrects students' gestures. Students practise until the tone and gesture are acceptable.   Step 4: The teacher introduces gesture (2). Steps same as step 2, 3.
Group 3
Movement training: Materials—CD--Vocal Music: Wiegenlied (Schubert)   Step 1: Children sit in a circle.   Step 2: After the teacher explains how to do the activity, students start moving.   Students walk 4 beats and physically relax and stretch for 4 beats.   Hand expression practice: pulling against a vocal line by following the music.   Hand expression leads to gesture 1 and 2.   Step 3: Same as method 2.

The gesture-designs used in the rehearsals were derived from reviewing literature and the researcher's private lessons followed by a Eurhythmics master Greenhead (the chairperson of Dalcroze Society in the UK). All the gesture design for vocal patterns were based on the principle of the following table (Table 4.4) (see details on page 41-42) in order to obtain a correct motor image.

Table 4.4 The Principles for Gesture Design

	Energy	Space	Depth
Singing higher	more	more	more
Singing lower	less	less	less

(McKinney, 1994:181-182)

The main purposes of using gesture were to improve vocal technique and to correct vocal faults. Unlike previous studies, the movement activities in this study were designed for three reasons: (1) to build up the body to be an effective instrument; (2) to support the gestures; and (3) to develop hand expression. The contents of movement training included: balance, physical centeredness, grounding, posture and alignment, moving through space, and controlling the whole weight of body movement. All the movement training programmes were based on Dalcroze Eurhythmics and the researcher's private lessons by following the Eurhythmics master, Greenhead. All the lesson programmes including gestures and movement activities were validated and revised by Professor Greenhead. For class programme examples see Appendix C and VCD track C.

Time Division

Table 4.5 shows the amount of time spent by each group on the different activities at different stages. Each lesson period consisted of two parts: (1) a vocalisation period; and (2) singing songs from the textbook. Because choral rehearsals took up most of the time

in vocal exercise sessions for developing the voice at an earlier stage, the groups spent 20 minutes on vocalisations and 10 minutes on singing songs at stage 1 (session 1-10). Next, the groups spent 15 minutes on vocalisations and 18 minutes on singing songs at stage 2 (session 11-18) and 12 minutes on vocalisations and 25 minutes on singing songs at the final stage (session 19-24). The delimitation for rehearsal arrangement was to control the time spent on the vocal exercise or the time spent on using the voice. Initially, the researcher considered arranging the same length for vocalisation sessions, but gesture and movement training naturally need more time because of gesture practices and movement activities that do not use voice. Furthermore, considering voice practice plays a vital role in developing vocal techniques which is more important than controlling the amount of vocalisation time, every attempt was made to keep the amount of time for singing the same for all three groups.

Table 4.5 Amount of Time Spent in minutes by Each Group on the Different Activities at Different Stages

			Group 1	Group 2	Group 3
Stage 1	*(Session 1-10)*				
	Vocalisation	Gesture or movement	0	7	12
		Using voice	**20**	**20**	**20**
	Singing songs		10	10	10
Stage2	*(Session 11-18)*				
	Vocalistion	Gesture or movement	0	4	8
		Using voice	**15**	**15**	**15**
	Singing songs		18	18	18
Stage 3	*(Session 19-24)*				
	Vocalisation	Gesture or movement	0	3	6
		Using voice	**12**	**12**	**12**
	Singing songs		25	25	25

Classroom

The school provided the conference meeting room for the teaching experiment and testing. The length is approximately 20 meters and the width is approximately 12 meters with a wooden floor. Basically, it comprises 105 seats and an empty area at the front of the room. The major vocal warm-up sessions were conducted in this area (6 x 12 m), whereas students were allowed to sit during the songs activity. A Casio Clavinova was used for this study. Three air-conditioners were also provided to keep the children at an optimum working temperature.

4. 5 Measurements

In order to determine the testing procedures, a pilot study was conducted prior to the pretest. Five students (2 boys and 3 girls) in the pilot study were fifth-grade children from the selected school who were not involved in the experiments in this study. Several details were checked:

- whether the task was too difficult (six vocal patterns)
- how many of practices were needed to get the right pitch and correct gesture
- pace and volume for presenting stimuli
- comfortable distance between the singer, microphone, and television monitor
- confidence of entry on a beat
- the way to give a reference note
- testing tiredness

Contents of Tests

Because no vocal pattern and song tests existed that were appropriate for the tests, stimuli were constructed to measure children's performance on what they had been trained to do by the researcher. These were checked by some singing experts and choral

directors. The measurements consisted of three different kinds of tests (see details in Appendix D & E and VCD track D):

(1) 6 vocal patterns—these six vocal patterns were selected for this study because they met the following criteria:

- They are popularly and commonly used in choral rehearsal especially for beginning choirs.

- Different kinds of melodic progression (descending, ascending, repeated, steps and leaps) and ranges (from C to high F) are included as being typical of choir repertoire and/or patterns song in general.

- The levels of difficulty vary.

- Short length (3-8 seconds) and simple rhythms are used to avoid unnecessary memory demands.

- Gestures were designed for these particular vocal patterns from a basic vocabulary (see research model on page 87).

- All of them were taught in the class.

(2) One Chinese art song and (3) 5 excerpts. These songs were selected because they met the following points which were considered appropriate for testing:

- The children were familiar with these songs except excerpt 5. All of them were drawn from primary school music textbooks.

- All of them were appropriate to the children's vocal ranges,

- The rhythms were not too complicated or difficult.

- Major vs. minor and happy vs. sad lyrics were included.

- Different styles of songs (Chinese folk song, Chinese art song, and foreign song) were included.

- These songs comprise the techniques of the above six vocal patterns and

gestures could be applied.

● The level of difficulty of songs varied from easy to difficult.

In order to explore the relationship between voice and gesture, and how gesture may help the voice, the children were asked to sing with gesture for six vocal patterns in the pretest and posttest. All the gestures were taught in the class, so the children know how to use them in the posttest. In the posttest, the Chinese art song was chosen for testing the children's gesture quality because it covers the basic gestures they had learnt in the training. Furthermore, the length of the song is approximately 50 seconds, so it provided enough information to assess the gesture qualities. All those testing gestures were validated by Professor Greenhead. The children were asked to sing the song with the assigned gestures (see these gestures in VCD track D).

Table 4.6 Different Tests for Individuals and Groups

	6 vocal patterns	1 song	5 excerpts	
Individuals	√	√	×	Pretest, Posttest
Groups (1, 2 & 3)	√	√	√	Pretest, Mid-test, Posttest

Note: the vocal patterns and song are the same both for individuals and groups.

Table 4.6 shows the different tests for all individuals and groups. Each individual was tested on 6 vocal patterns and one song for both pretest and posttest; whereas each group got one more test on excerpts (pretest, posttest and mid-test). The children in Group 1 were tested for their singing ability (singing without gesture); whereas those in Groups 2 and 3 were tested for their singing ability (singing without gesture) and gesture performance (singing with gesture).

Test Materials

Although live presentation of the test materials to children may be a more comfortable and friendly method, it may not be so easy to control the pace of each vocal pattern (the duration of the gap between vocal patterns) or the quality of a given reference sound. In addition, live performances may have produced an increased numbers of errors in the stimuli since the researcher needed to undertake many repetitions of the demonstrations. By using video such error or even presentational style variability was eliminated. Furthermore, the researcher was a stranger to the children in the pretest (the children may have felt uncomfortable facing a stranger), but became a person they had got to know at both the mid-test and posttest. Therefore, a pre-recorded videocassette was considered appropriate to ensure that the children received a consistent stimulus with which to work. Finally, when interviewed, the children in the pilot study stated that they preferred the pre-recorded videocassette to a live demonstration for personal work.

Two pre-recorded videocassettes were prepared. The six vocal patterns and five excerpts were presented in a random sequence to control for ordering effects. There were 4 different stimulus tapes created for individual test and 3 different stimulus tapes created for group test. These pre-recorded videocassettes were recorded by digital video camera so that the quality was reliable. In order to control the confounding variables, the presented materials and response lengths for each subject remained the same and well controlled. The way they were presented was shown on VCD track E. Directions recorded on the stimulus tape were " 'Listen to the piano' (played by Clavinova, notation was shown on the screen); 'Sing' or 'Sing with gesture' (blue screen while singing)". For the individual singing task, Group 1 echo-sang the pattern in response to the stimulus recording, and Groups 2 and 3, in addition, sang with gesture. In order to achieve a consistent result in the procedure, regardless of whether a child had an upper

or lower vocal range, they were all tested on the same vocal pattern at the same range. The starting pitch of the song was given a D (above middle C) on the piano. This key may be a little higher for singing range before training (as the pitch goes up one octave). But, it was expected that they would extend their range after training. Because this song originally printed in the textbook was Major G (starting on a D), it is believed that it is a comfortable for children's singing range.

Testing Room

The measurements were taken in the same room while the lessons were being conducted (These were recorded for subsequent analysis—see later). Figure 4.2 shows the positions and distances between the subject and other objects for the individual tests. Figure 4.3 demonstrates the positions and distances between the singers and other objects for group tests. Note that the children had to be well-recorded for subsequent performance quality ratings. Because the testing room was not set up for professional recording, the position of the external microphones would influence the tonal balance (e.g. the child who was close to the external microphone may have been heard more loudly than others). In order to avoid this effect, the external microphone was not used in the group tests, only the inbuilt microphone that existed on the camera.

Procedures

At the beginning of each data-collection session, the vocal patterns, song, and excerpts were reviewed and practised for the students participating in the study during that particular session. However, no instruction was provided in this practice. In order to control for confounding variables, the researcher conducted all the tests which included pretest, mid-test and posttest, and for individual and group. In other words, only the subjects and the researcher were in the testing room.
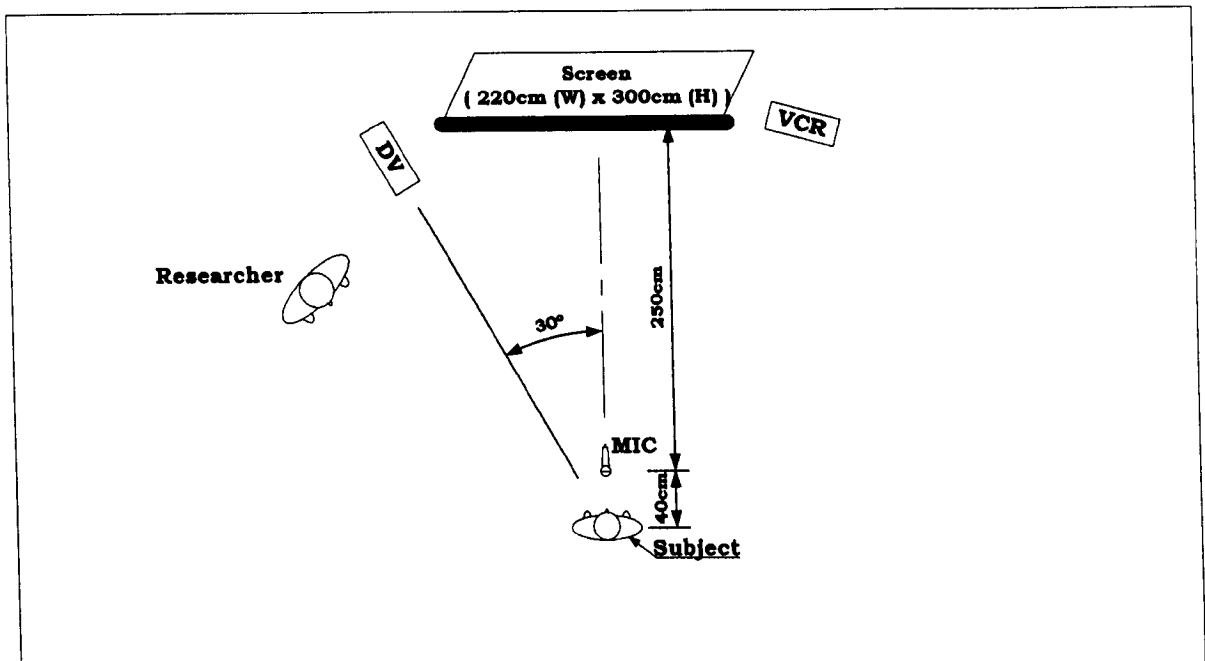
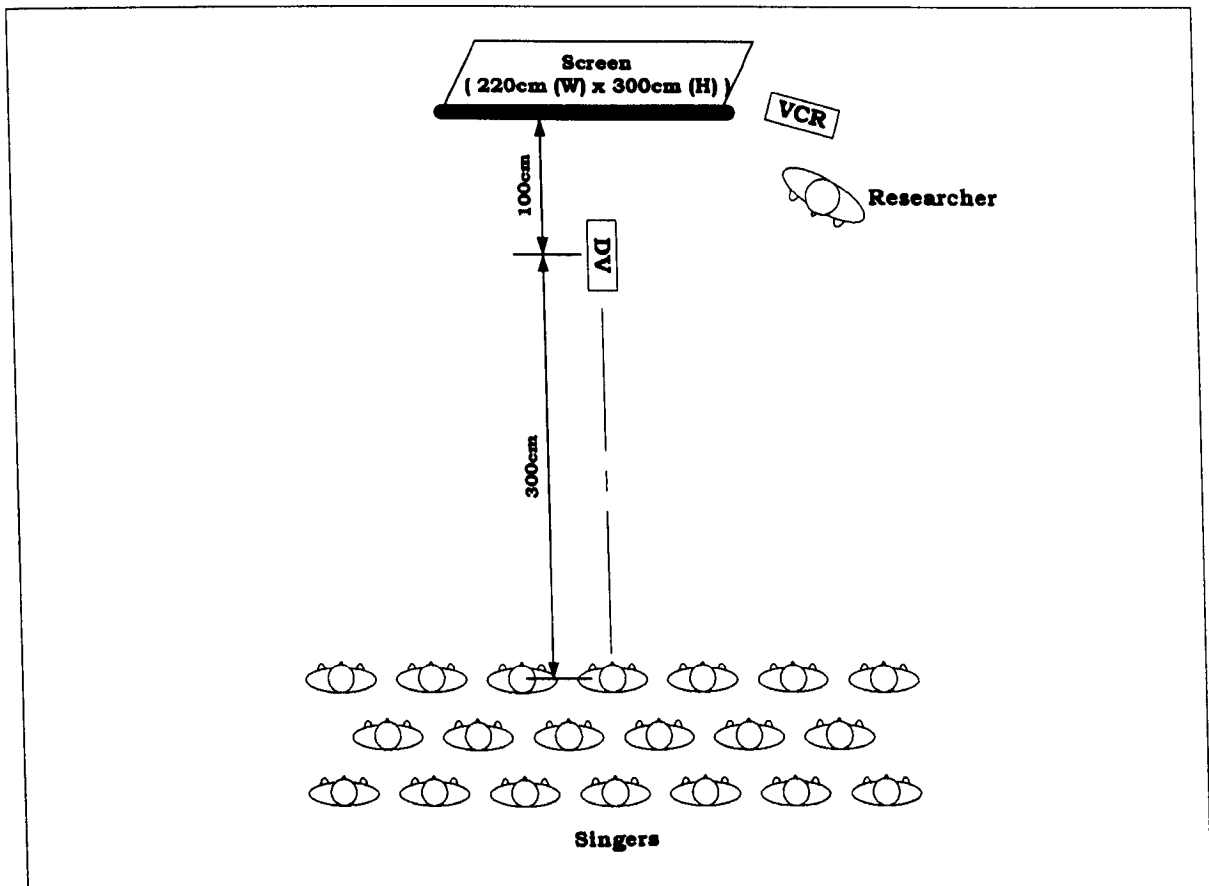**Figure 4.2** The Positions and Distances Between the Subject and Other Objects for the Individual Test

Figure 4.3 The Positions and Distances Between the Singers and Other Objects for Group Test

(1) Individual test

Students were randomly selected to come in groups of five. In other words, 5 children were tested at the same session. Before starting the test, simple physical and vocal warm-up were provided. The song was reviewed once and the six vocal patterns were reviewed three times (sing with and without gesture). The researcher chatted briefly with the children to help put them at ease, explained what they were going to do, and encouraged them to sing as well as possible. Thereafter, one child was left in the testing room and the other four children were asked to stay in a separate room. Next, the child was instructed to do the formal test individually by following the video directions. Unless the child sang any wrong notes, the video was not stopped. The presentation orders of stimulus and test task were shown in as displayed in Table 4.7.

Table 4.7 The Presentation Orders of Stimulus and Test Task for Individual

Order	Stimulus	Task
1	6 vocal patterns	Sing without gesture
2	Song	Sing without gesture (Group 1 ended of here)
3	6 vocal patterns	Sing with gesture
4	Song	Sing with gesture (only for posttest)

Note: These orders were randomly presented in each group

The order of 6 vocal patterns were presented randomly for each child

Following the treatment period, posttest measures commenced after 24 sessions. All students were administered the testing measure again. The procedures were the same as the pretest in addition to the practice period. Because all the children were getting familiar and bored with repeating the vocal patterns and song, the practice before the test was skipped. However, the children practised the song with gesture for three times because the gestures were not as familiar as those for the vocal patterns. The researcher gave a cue to the children to remind them of the gestures as all had been used in the class at same point.

(2) Group test

Similar to individual test, simple physical and vocal warm-ups were provided before the

test. The song was reviewed once, and the six vocal patterns and five excerpts were

reviewed three times. The researcher chatted briefly with the group to help put them at

ease. Next, the formal test was conducted by following the video directions. All of the

group tests were unison singing. The presentation orders of stimulus and test task are

shown in Table 4.8.

Table 4.8 The Presentation Orders of Stimulus and Test Task for Group

Order	Stimulus	Task
1	6 vocal patterns	Sing without gesture
2	5 excerpts	Sing without gesture
3	1 song	Sing without gesture

Note: These orders were randomly presented in each group

The order of 6 vocal patterns and 5 excerpts were presented randomly for each group

Following the treatment period, mid-test measures commenced after 14 sessions and

posttest measure commenced after 24 sessions. The procedures were the same as the

pretest.

4. 6 Voice and Gesture Recording and Coding

All the voice and motor performances were recorded using a Panasonic digital video

camera. Stimulus tapes were played on a Toshiba stereo videocassette tape recorder. All

the raw data of the video recordings were transferred to the computer using *Ulead Video*

Studio version 4 software. All the voices were saved as a *.mp3 style (total: 1318 voice

files), whereas all the gestures were saved as a *.mpg style respectively (total: 468

gesture files).

4.7 Assessment

There are two main forms for singing assessment: (1) human assessment and (2) machine-based assessment. Welch (1994) stressed that the importance of choosing an appropriate assessment method should be based on considering the purpose of the evaluation. He suggested that if the assessment emphasis is more on the musical aspects of the singing behaviour, the "human assessment" mode becomes more significant. In choral singing, not only the accuracy of voice but also the beauty of singing is regarded of equal importance in performance manners. Therefore, an appropriate assessment of musical and aesthetic attributes is extremely critical in this study instead of machine-based assessment which provides the information of voice from moment to moment. Similarly, motor skills assessment was also based on human assessment. A continuous nine-point scale was used for the singing and gesture assessment. The rating sheets used by the judges are shown in Appendix F.

Raters

Three groups of raters with experience as choral conductors, recital singers or movement teachers were invited to participate in assessments separately (see the rater profiles in Table 4.9).

Table 4.9 A Profile of the Raters

Group	Rater	Position	Experience
Group1 (vocal pattern)	Rater 1	Associate Professor	Voice teacher At least 20 years choral directing experience Much experience in rating choral competitions
	Rater 2	Senior lecturer	Voice teacher At least 12 years choral directing experience An active director in Taipei Much experience in rating choral competitions
	Rater 3	Senior lecturer	Voice teacher At least 20 years choral directing experience

Group	Rater	Position	Experience
Group 2 (excerpt, song)	Rater 1	Senior lecturer	Voice teacher At least 15 years choral conducting experience
	Rater 2	Primary music teacher	At least 15 years choral conducting in children She has won many prizes for her conducting
	Rater 3	Associate Professor	Expert in music education At least 15 years choral conducting experience
	Rater 4	Professional singer	A very famous singer in Taiwan At least 10 years choral conducting experience Much experience in rating choral competitions
Group 3 (gesture quality)	Rater 1	Associate Professor	Dance teacher Expert in dance education At least 20 years in dance teaching
	Rater 2	Dance teacher	Has taught children to dance for at least 20 years A very good singer
	Rater 3	Senior lecturer	Has taught voice and movement for at least 15 years

The first group of three raters was asked to judge the children's singing performances (Intonation and Tone Quality) on the vocal pattern test for individuals and groups, and the second group of four raters was asked to judge the excerpt and song test for individuals and groups. Last, another three teachers were asked to judge the gesture performance (Body Efficiency, Mastery of Gesture Technique and Coordination of Voice and Gesture). These three groups of judges evaluated at different places and dates but the presenting instruments and the presenter were the same.

Assessment Procedures

Slavin (1992) stated that one of the reasons leading to an inconsistency among raters is lack of 'judge training'. In order to achieve a more reliable and precise evaluation, the assessment procedures were painstakingly controlled taking the following steps (Figure 4.4):
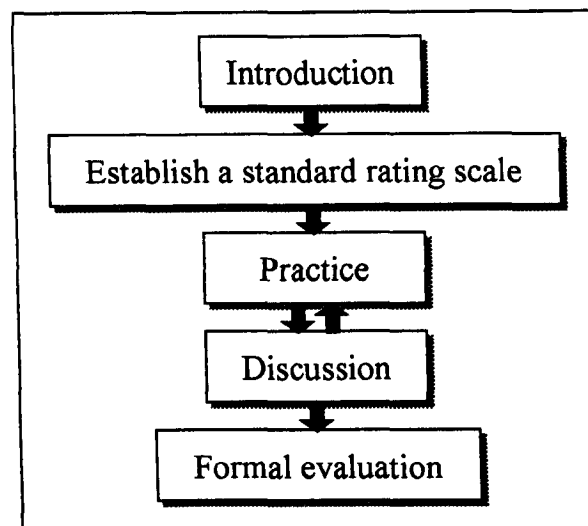
Figure 4.4   The Steps of Assessment Procedures

Step 1: Introduction

The three or four raters and the researcher met together in a comfortable room. The researcher introduced briefly the rating criteria and details relevant to the assessment, and gave a demonstration on how to rate it. To prevent a small range of scores, the raters were encouraged to use the full range of the rating scale.

Step 2: Establish a standard rating scale

Slavin (1992:207) stated that " without a specific criterion for each label, each judge establishes his or her own criterion". In order to promote the reliability of assessment, simple rating criteria were provided to the raters instead of a simple term from poor to excellent. These specific rating criteria were established by the researcher for the purposes of this study that were derived from the literature (Tamte-Horan, 1989; Phillips, 1992 on vocal techniques— Intonation and Tone Quality) (Kirkendall, Gruber and Johnson, 1987; Greenhead, 2002 for gesture quality: Body Efficiency, Mastery of Gesture Technique, and Coordination of Voice and Gesture) and confirmed in consultation with two experienced voice teachers, two choral conductors and two dance teachers. One of the raters was chosen to gather others' opinions for revision of the criteria. Thereafter, a standard rating scale, established by the three/four raters, was ready for the

evaluations.

Step 3: Practice

Three trials were given for practice.

Step 4: Discussion

After judging, every rater was asked to show his/her score. If their scores differed a lot (e.g. if the scores given varied by 3 points or more between two raters), they explained their reasons why they gave this score. Again, the leader was responsible for this negotiation and re-identified their rating criteria. This was supported by Slavin (1992), who states:

> *Reliability in judgmental decisions can occur only if the criteria are clearly defined and spelled out and if the judges have been systematically trained to employ specific criteria in evaluating the performance (Slavin, 1992:207).*

After discussion, they practised again (repeat steps 3 and 4) until their results were consistent.

Step 5: Formal assessment

Once the raters' agreement has reached a standard level, the formal evaluation could be undertaken separately. In order to keep the same standards, each rater was asked to finish at least 50 trials on that day. Five previous scores given by the rater were reported to remind the rater's standard rating scale for a later rating time. All of them finished the assessment in 10 days from the first meeting. All of the stimuli were presented to the raters in different random orders.

Rhythm accuracy was not scored because of the difficulty of scoring pauses, hesitations, or pauses for aside comments in the middle of songs that were common under these unstructured conditions. All of the stimuli were presented on a notebook computer with

external SANYONG speakers. Sound was provided for assessing vocal technique—Intonation and Tone Quality. Video with mute was provided for assessing Body Efficiency and Mastery of Gesture Technique, whereas audio and video were provided for assessing Coordination of Voice and Gesture. Because the vocal patterns are short, the raters were also asked to rate the Overall Gesture Quality.

4.8   Supplementary qualitative data

To supplement the quantitative data, a short questionnaire was introduced to collect qualitative reports from the children after their experiences during training. These questionnaires were completed at the end of the training and an example of one of is shown in Appendix G. At times, in the discussion of the quantitative results, these questionnaires will be drawn upon. In order to develop a series of teaching tools to train children with 'effective' gestures and movements, the teaching notes and researcher's critical self-reflections were recorded. These are used in the thesis to support the qualitative results.

The previous pilot study explored the very intimate relationship between voice and gesture. Furthermore, the positive effect of using gesture in aiding children's singing was discussed. In this main experiment, quantitative methods were used to answer the following questions:

1.   Is it possible to develop an effective teaching technique based on gesture and movement training for children's choral singing?

2.   Can gesture techniques enhance the vocal technique in intonation and tone quality?

3.   What is the role of movement training in effective gesture?

4.   Is the gesture effective only to the singers who have gesture and movement training?

5. Are there any requirements for a successful gesture?

CHAPTER 5

COMPARING THREE TRAINING TECHNIQUES

The rationale for the current study of the effects of gesture and movement training for improving vocal techniques and effective gestures has been described in Chapter 2. A qualitative investigation of the pilot study in Chapter 3 indicated that gesture and movement were very positive in facilitating children's singing. This current chapter will present the results of comparing the effects of the three training techniques with gesture or/and movement on Intonation and Tone Quality. Each individual student was pretested and posttested. In the group contexts, the children were pretested, mid-tested and posttested all working together. Singing performances were used to measure the dependent variables of vocal technique: Intonation and Tone Quality.

5.1 Results

In the section which follows the results of the study will be reported. First, all the children who worked individually will be reported, then the groups. The following training techniques will be compared by their effects in improving vocal techniques.

Training technique 1 (TT1)— no gesture or movement training

Training technique 2 (TT2)— gesture training

Training technique 3 (TT3)— gesture and movement training

Furthermore, the effects of gesture and movement training will be analysed by examining the children's achievements in Intonation and Tone Quality in vocal exercises undertaken; and the relative difficulties encountered in the vocal exercises will also be discussed.

In this chapter, several different statistical methods were used for different purposes. ANCOVA was used to examine the training effect (using the pretest score as a covariate when comparing posttest scores). ANOVA was used to examine the difficulties of vocal patterns (dealing with pretest scores only). Finally, a repeated-measures ANOVA was used to examine the interaction between improvement and vocal patterns for the analysis of the individual data (i.e. it examined the three groups in all of the five vocal patterns). Another a repeated-measures ANOVA was used to examine the interaction between Group and Training Stage for the group data (i.e. it examined the three groups at all the three training stages).

Individual

The test for the individual children consists of two different singing ability tests: (1) vocal patterns test and (2) a song test. The following paragraphs show the results of individual vocal techniques both for Intonation and Tone Quality.

Individual: Vocal Pattern

Three expert judges were asked to rate the six vocal patterns (VP) performed by the children. A series of Pearson correlations was undertaken to assess initially the degree of correlation between the raters' scores. The results of the first five vocal patterns (VP1, VP2, VP3, VP4, and VP5) revealed that the scores of all the raters were significantly correlated at the 0.01 level (2-tailed) both in judging Intonation and Tone Quality. The inter-rater reliability of Raters 1 and 2 was 0.587, that of Raters 1 and 3 was 0.607, and that of Raters 2 and 3 was 0.551. However, there was no significant correlation for inter-rater reliability on VP6 with 0.132 being attained for Intonation and -0.023 for Tone Quality. Because of the inconsistency of the raters in VP6, it has been removed from the data analysis. This effect will be discussed more fully on page 134.

Intonation

Table 5.1 presents the means and standard deviations for individual intonation scores of vocal patterns in pretest, posttest and adjusted posttest. The overall adjusted posttest mean rating score of Group 3 (M= 5.19, SD= 0.69) was higher than those of Group 2 (M=4.72, SD=0.70) and than Group 1 respectively (M= 4.04, SD=0.71). It can be seen that the training methods using gesture and movement training produced better results than that with only gesture training, and was much better than that with none. Individual scores for vocal patterns are shown in Table 5.1.

Table 5.1 Means and Standard Deviations for Individual Intonation Score of Vocal Patterns in the Pretest, Posttest and Adjusted Posttest

	Vocal Pattern	Group 1 (N=17)		Group 2 (N=18)		Group 3 (N=18)	
		Mean	SD	Mean	SD	Mean	SD
	VP1	3.80	1.41	4.32	1.81	4.13	1.18
	VP2	3.51	1.24	4.24	1.18	3.74	1.23
	VP3	2.80	1.36	3.41	1.77	3.33	0.96
	VP4	3.26	1.30	4.13	1.47	3.65	1.42
	VP5	2.31	1.33	2.82	1.38	2.98	1.41
Pretest	**Overall★**	**3.14**	0.85	**3.78**	1.23	**3.57**	0.84
	VP1	4.33	1.07	4.93	1.53	5.18	1.37
	VP2	4.16	1.32	4.74	1.22	5.26	1.11
	VP3	3.94	1.48	5.04	1.25	5.61	1.24
	VP4	4.00	1.04	5.22	1.19	5.50	1.04
	VP5	2.80	1.43	4.39	1.73	4.56	1.50
Posttest	**Overall**	**3.85**	0.92	**4.86**	0.92	**5.22**	0.72
	VP1	4.42	1.29	4.86	1.28	5.17	1.28
	VP2	4.35	0.99	4.50	1.00	5.32	0.98
	VP3	3.96	1.35	5.02	1.34	5.60	1.34
	VP4	4.09	1.08	5.13	1.08	5.51	1.06
	VP5	2.97	1.49	4.35	1.47	4.44	1.48
Adjusted✿	**Overall**	**4.04**	0.71	**4.72**	0.70	**5.19**	0.69

★ *Overall score= (VP1+VP2+VP3+VP4+VP5)/5*

✿ *The adjusted score is a modified posttest score. The modification eliminates variability attributable to initial differences in singing ability as given by the pretest score.*

A null sub-hypothesis of this study was:

H_0: There is no difference between three training techniques on children's vocal pattern intonation score.

Because of the pretest-posttest design in this study, it is very important to control for initial differences between groups before doing any statistical analysis (Borg, Gall, & Gall, 1993; Dancey & Reidy, 2002). Therefore, an analysis of covariance (ANCOVA) using pretest score as the covariate was utilised to assess the importance of the differences between the three training techniques. The analyses revealed the following main effects after adjusting for the pretest score: VP2 [$F_{(2,49)}$ = 4.981, $p < 0.05$], VP3 [$F_{(2,49)}$ = 6.573, $p < 0.01$], VP4 [$F_{(2,49)}$ = 8.027, $p = 0.01$], VP5 [$F_{(2,49)}$ = 5.225, $p < 0.01$], and Overall [$F_{(2,49)}$ = 11.822, $p < 0.001$]. There was no significant effect of VP1 [$F_{(2,49)}$ = 1.515, $p = 0.230$] (see Table 5.2). Therefore, the null hypothesis was rejected. At least

Table 5.2   Summary Table of ANCOVA for Individual Intonation Scores on Vocal Patterns

Source	Sum of Squares	df	Mean Square	F	p
VP1	4.951	2	2.476	1.515	0.230
VP2	9.597	2	4.798	4.981	0.011*
VP3	23.352	2	11.676	6.573	0.003**
VP4	18.179	2	9.090	8.027	0.001**
VP5	22.505	2	11.253	5.225	0.009**
Overall	11.243	2	5.622	11.822	0.000***

* $p < .05$; ** $p < .01$; *** $p < .001$

two of the methods differed with regard to intonation scores. Examining the data further to look for the source of variance, Sidak *post hoc* analysis revealed that Group 1 was different from Group 2 in VP4, VP5 and Overall, whereas Group 1 differed significantly from Group 3 in VP2, VP3, VP4, VP5 and Overall. This supports the experimental expectation that children with gesture and/or gesture and movement training do indeed lead to a significantly higher achievement in Intonation than those

who trained in the method without gesture and movement training. However, there was no significant difference between Groups 2 and 3.

Tone Quality

Table 5.3 illustrates the means and standard deviations for individual tone quality scores of vocal patterns in the pretest, posttest and adjusted posttest. The overall adjusted posttest mean rating score of Group 3 (M= 5.37, SD= 0.68) was higher than Group 2 (M=4.67, SD=0.69) and than Group 1 (M= 4.06, SD=0.69). Again, it can be seen that the method with gesture and movement training scores higher than the other two methods. Individual scores for vocal patterns are shown in Table 5.3.

Table 5.3   Means and Standard Deviations for Individual Tone Quality Score of Vocal Patterns in the Pretest, Posttest and Adjusted Posttest

	Vocal Pattern	Group 1(N=17) Mean	SD	Group 2 (N=18) Mean	SD	Group 3 (N=18) Mean	SD
	VP1	4.18	1.13	4.70	1.60	4.43	1.01
	VP2	3.55	0.80	4.20	1.15	3.72	1.05
	VP3	2.82	1.19	3.37	1.77	3.15	0.85
	VP4	3.24	1.02	4.20	1.39	3.91	1.01
	VP5	2.92	1.21	3.15	1.32	3.09	1.18
Pretest	**Overall**	**3.34**	0.63	**3.93**	1.19	**3.66**	0.62
	VP1	4.31	1.07	4.89	1.55	5.37	1.51
	VP2	4.02	1.06	4.67	1.15	5.06	1.10
	VP3	3.94	1.63	5.00	1.55	5.63	1.43
	VP4	3.94	0.93	5.11	1.34	5.54	1.14
	VP5	3.00	0.90	4.67	1.56	5.32	1.13
Posttest	**Overall**	**3.84**	0.85	**4.87**	1.06	**5.38**	0.78
	VP1	4.46	1.23	4.74	1.23	5.38	1.22
	VP2	4.17	0.99	4.47	1.00	5.11	0.98
	VP3	4.04	1.49	4.91	1.49	5.62	1.48
	VP4	4.18	1.09	4.93	1.08	5.49	1.05
	VP5	3.05	1.17	4.63	1.17	5.30	1.17
Adjusted	**Overall**	**4.06**	0.69	**4.67**	0.69	**5.37**	0.68

A further null sub-hypothesis in this study was as below:

H₀: There is no difference between three training techniques on children's tone quality of vocal pattern score.

Similar to the results of Intonation, a one-way analysis of covariance, using pretest scores as the covariate, shown in Table 5.4 indicated the following main effects: VP2 [$F_{(2,49)}$ = 4.252, p< 0.05], VP3 [$F_{(2,49)}$ = 4.902, p< 0.05], VP4 [$F_{(2,49)}$ = 6.366, p< 0.01], VP5 [$F_{(2,49)}$ = 17.081, p< 0.001], and Overall [$F_{(2,49)}$ = 16.205, p< 0.001 p< 0.01]. There was no significant effect of VP1 [$F_{(2,49)}$ = 2.627, p= 0.082]. The Sidak *post hoc* analysis confirmed that significant differences existed between Group 1 and Group 2 in VP5 and Overall, and Group 1 and Group 3 in VP2, VP3, VP4, VP5 and Overall. Therefore, the null hypothesis was rejected, which supports the experimental expectation that children with gesture and/or gesture and movement training do indeed lead to a significant higher achievement in Tone Quality than those who trained on the method without gesture and movement training.

Table 5.4   Summary Table of ANCOVA for Individual Tone Quality Scores on Vocal Patterns

Source	Sum of Squares	df	Mean Square	F	*p*
VP1	7.793	2	3.896	2.627	0.082
VP2	8.174	2	4.087	4.252	0.020*
VP3	21.488	2	10.744	4.902	0.011*
VP4	14.074	2	7.037	6.366	0.003**
VP5	46.442	2	23.221	17.081	0.000***
Overall	14.806	2	7.403	16.205	0.000***

*p< .05; **p< .01; ***p< .001

Vocal Pattern Difficulty

Although the analysis of vocal pattern difficulty is not the main focus of this study, it nevertheless provides important insights into the effects of training. In order to avoid

the training effect, the pretest scores were used to assess vocal pattern difficulty. The following analyses examine the difficulties of the vocal patterns and children's performance on them. As shown in Table 5.5, one-way ANOVA indicated that there was a significant difference in the main effect of vocal patterns [$F_{(4,260)}$ = 11.057, $p<$ 0.001]. The Sidak *post hoc* analysis showed that VP1 got higher scores than VP3 and VP5. According to homogeneous subsets (Table 5.6), it can be seen that the difficulty of VP3 and VP5 was a little higher than VP2 and VP4, but this effect was non-significant. The difficulty of VP2 and VP4 was also a little higher than VP1, but again non-significant.

Table 5.5 ANOVA for Vocal Pattern Difficulty

Source	Sum of Squares	df	Mean Square	F	Sig.
Vocal Pattern	74.341	4	18.585	11.057	.000***
Residual	437.012	260	1.681		
Total	511.353	264			

***$p<0.001$

Table 5.6 Homogeneous Subsets of Vocal Pattern Difficulty

VP	N	Subset for alpha = .05		
		1	2	3
VP5	53	2.8866		
VP3	53	3.2896	3.2896	
VP2	53		3.9026	3.9026
VP4	53		3.9213	3.9213
VP1	53			4.3962
Sig.	53	.634	.182	.430

As Figure 5.1, which shows the mean scores, demonstrates, VP5 (2.89, SD=1.24) and VP3 (3.29, SD=1.43) received the lowest scores; VP2 (3.90, SD=1.14) and VP4 (3.92, SD=1.30) received moderate scores; whilst VP1 (4.40, SD=1.35) received the highest score. The standard deviations showed that all the vocal patterns had similar levels of

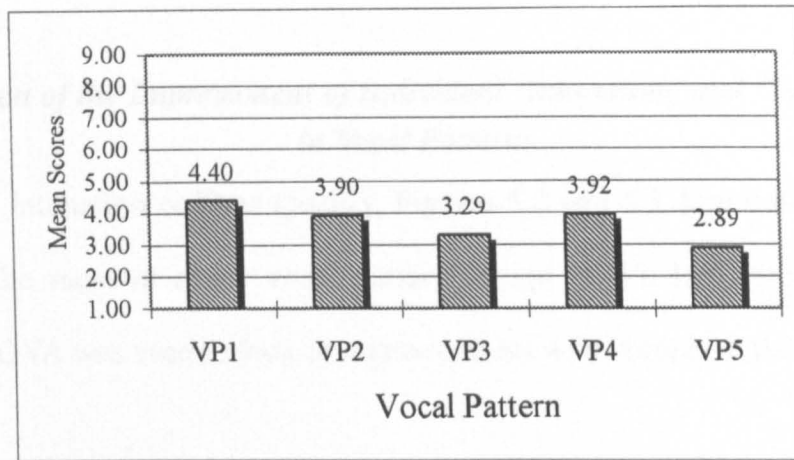variability, which may imply that children perform equally in each vocal pattern.

Figure 5.1   Mean Scores for each Vocal Pattern in the Pretest

Table 5.7 shows the analysis of five vocal patterns' difficulties by range, melodic progression, and vowels. According to earlier findings, the following results were found:

1. The higher the register, the greater the difficulty.

2. A big jump is more difficult than a small jump or leap.

Table 5.7   Analysis of Five Vocal Patterns

Vocal Pattern	Range	Progression	Vowel	Rank of Difficulty
VP1	D to A	Small jump	i-e	Easy
VP2	F to A	Leaps and small jump	i-a	Medium
VP3	A to high E	Descending	ai	Difficult
VP4	C to high C	Octave sliding	i-a	Medium
VP5	A to F	Broken chord	u	Difficult

Therefore, the five vocal patterns may be classified into three levels of difficulty

according to the above analysis: VP5 and VP3 are "Difficult", VP2 and VP4 are "Medium", and VP1 is "Easy".

Comparison of the Improvement of Individual 'Intonation' and 'Tone Quality' in Vocal Patterns

Regardless of Intonation or Tone Quality, Figures 5.2 and 5.3 demonstrate that Group 3 improved the most in every vocal pattern except VP5's Intonation. A repeated-measures ANOVA was used to look at improvements with respect to the stage in the
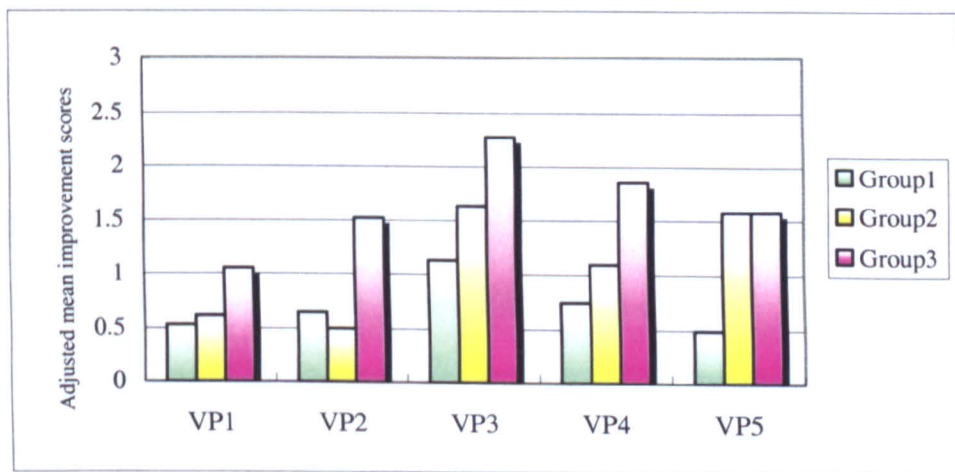

Figure 5.2   Comparison of Vocal Pattern in Different Groups in Children's Individual Intonation Improvement
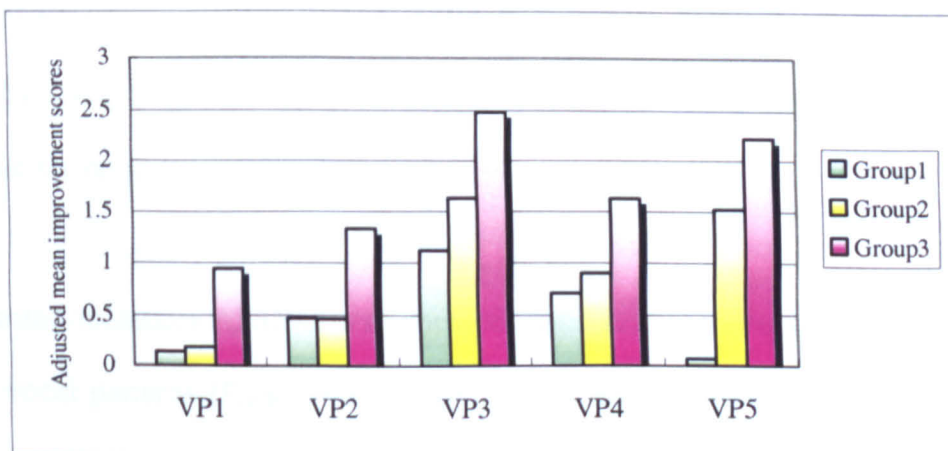

Figure 5.3   Comparison of Vocal Pattern in Different Groups in Children's Individual Tone Quality Improvement

training of the pupils. ANOVA analysis indicated that an improvement on Intonation showed a significant difference in three groups [$F_{(2,50)}$ = 5.761, $p<$ .01]. Using the Sidak approach to *post hoc* analysis, it revealed that the intonation improvement of Group 1 was significantly lower than that of Group 3. No significant difference was found between Groups 1 and 2 or Groups 2 and 3. Therefore, it can be seen that the children who had received both gesture and movement training gained a higher improvement in Intonation than those who had not.

In addition, the results revealed that the improvement on Tone Quality also showed a significant difference in the three groups [$F_{(2,50)}$ = 13.230, $p<$ .001]. Sidak *post hoc* analysis indicated that Group 3 gained a greater improvement than Group 1 and Group 2. Therefore, it again can be seen that the children who had received both gesture and movement training gained a higher improvement in Tone Quality than those who had not or those who only had gesture training. According to these findings, it can be concluded that gesture training is an important factor in improving children's intonation and tone quality in vocalising. Furthermore, it also suggests that if the children received both gesture and movement training during vocal warm up sessions, this would be a powerful way to help build their voices. However, it can be observed that children improved more in Tone Quality than Intonation by combining gesture and movement training.

The repeated-measures ANOVA also showed that there was a significant difference in the five vocal patterns [$F_{(4,200)}$ = 3.157, $p<$ .05] in Intonation. Sidak *post hoc* analysis revealed that VP3 was significantly different from VP1. In other words, the children improved more in Intonation on VP3 than on VP1. In addition, it showed a significant difference in the five vocal patterns [$F_{(4,200)}$ = 7.881, $p<$ .001] on Tone Quality. Sidak

post hoc analysis revealed that VP1 was significantly different from VP3, VP4 and VP5, whereas VP2 was also significantly different from VP3. According to Figure 5.2 and 5.3, Groups 2 and 3 made more progression in VP3 and VP5 among these five vocal patterns. In other words, the more difficult the vocal patterns, the more progression the gesture and movement training groups made. Therefore, it may be inferred that gesture aids children more in overcoming difficult vocal patterns than easier ones. Furthermore, Group 3 made a dramatic progression both in the performance of Intonation in VP3 and Tone Quality in VP3 and VP5. This may imply that the powerful effect of gesture and movement training method or the particular gesture (VP3: gathering) (VP5: gathering, pulling something toward the body) (details for those gesture see Appendix E or VCD D) is effective for VP3 and VP5. The interactions between Group and Vocal Pattern were not found both in Intonation and Tone Quality.

Individual: Song

Three experts were asked to evaluate the children's intonation and tone quality ability in singing a song. The results indicated a moderate positive and significant correlation at the 0.01 level (2-tailed) both in judging Intonation and Tone Quality by using a Pearson correlation matrix. The inter-rater reliability of Intonation by Raters 1 and 2 was 0.791, that of Raters 1 and 3 was 0.756, and that of Raters 2 and 3 was 0.740; reliability of Tone Quality by Raters 1 and 2 was 0.680, that of Raters 1 and 3 was 0.610, and that of Raters 2 and 3 was 0.687. It seems that the raters' assessment consistency in Intonation is higher than in Tone Quality.

Intonation

Table 5.8 shows the means and standard deviations of intonation achievement in the

pretest, posttest and adjusted posttest. It can be seen that Group 3's adjusted mean (M=5.47, SD=1.12) scored higher than that of Group 2 (M=4.85, SD=1.13), who scored higher than Group 1 (M=4.41, SD=1.13).

Table 5.8   Means and Standard Deviations for Individual Intonation Score of Singing a Song in the Pretest, Posttest and Adjusted Posttest

	Group 1 (N=17)		Group 2 (N=18)		Group 3 (N=18)	
	Mean	SD	Mean	SD	Mean	SD
Pretest	3.42	1.50	4.16	1.80	3.89	1.48
Posttest	4.12	1.62	5.09	1.76	5.51	1.38
Adjusted Posttest	**4.41**	1.13	**4.85**	1.13	**5.47**	1.12

One of the null sub-hypothesis in this study was as below:

H$_0$:   There is no significant difference between the three training techniques in children's song singing intonation score.

ANCOVA analysis indicated that the three groups differed in their Intonation scores [F$_{(2,49)}$ = 3.915, p< 0.05] (see Table 5.9). Follow-up Sidak *post hoc* analysis revealed

Table 5.9   ANCOVA for Individual Intonation Score on Singing a Song

Source	Sum of Squares	df	Mean Square	F	p
Group	9.844	2	4.922	3.915	0.026*
Error	61.599	49	1.257		
Total	79.360★	51			

*p<.05

★The error and the group do not add up to the total as this is an abbreviated table with covariates removed.

that Group 3 scored significantly higher than Group 1. Therefore, the null hypothesis was rejected which supports the experimental expectation that the combination of gesture and movement training leads to a significant improvement of children's intonation while singing songs. However, a significant difference was not found to

exist between Group 1 and 2. It suggests that the gesture training alone was not significant in improving song singing.

Table 5.10 Means and Standard Deviations for Individual Tone Quality Score of Singing a Song in Pretest, Posttest and Adjusted Posttest

	Group 1 (N=17)		Group 2 (N=18)		Group 3 (N=18)	
	Mean	SD	Mean	SD	Mean	SD
Pretest	3.52	1.29	4.05	1.48	3.89	1.20
Posttest	4.17	1.31	4.94	1.54	5.31	1.09
Adjusted Posttest	**4.37**	1.02	**4.79**	1.02	**5.27**	1.01

Tone Quality

From Table 5.10, it can be seen that Group 3's adjusted posttest mean score (5.27, SD=1.01) was higher than Group 2 (4.79, SD=1.02) and much higher than Group 1 (4.37, SD=1.02). The null sub-hypothesis in this study was as below:

H_0: There is no significant difference between the three training techniques on tone quality score in children's song singing.

Similar to Intonation, the analysis of covariance in Table 5.11 showed that main significant effects [$F_{(2,49)}$ = 3.556, p< 0.05] were found. Subsequently, Sidak *post hoc*

Table 5.11 ANCOVA for Individual Tone Quality Score on Singing a Song

Source	Sum of Squares	df	Mean Square	F	p
Group	7.111	2	3.556	3.476	0.039*
Error	50.117	49	1.023		
Total	62.010✦	51			

p<.05

✦*The error and the group do not add up to the total as this is an abbreviated table with covariates removed.*

analysis revealed that Group 3 scored significantly higher than Group 1. Therefore, the null hypothesis was rejected which supports the experimental expectation that a

combination of gesture and movement training resulted in higher achievement in children's song singing than the method with no gesture and movement training in Tone Quality.

The effects of gesture and movement in improving vocal techniques, for both Intonation and Tone Quality, led to significant success both in vocal pattern and song tests. However, a combination of gesture and movement training (TT3) and the method with only gesture training (TT2) were significantly better than the method without gesture and movement training (TT1) in vocal pattern test but only TT3 was significantly better than TT1 in song test. Therefore, the instruction effect on vocal pattern is faster than that of singing songs. It may suggest that more instruction time is necessary to see the difference between gesture and movement training method (TT3) and gesture training method (TT2) in song singing.

Group

The test contents used in the group consisted of (1) six vocal patterns (2) five excerpts and (3) one song. The following section shows the results of choral Intonation and Tone Quality. The three groups were pretested, mid-tested and posttested.

Group: Vocal Pattern

There were three experts participating in the assessment. The inter-rater reliability in every vocal pattern was significantly correlated at the 0.01 level (2 tailed) in judging Intonation and Tone Quality across all six vocal patterns. The inter-rater reliability of Raters 1 and 2 was 0.847, that of Raters 1 and 3 was 0.846, and that of Raters 2 and 3 was 0.823 in Intonation; reliability of Raters 1 and 2 was 0.821, that of Raters 1 and 3 was 0.820, and finally, that of Raters 2 and 3 was 0.787 in Tone Quality. It was found

that the raters were more consistent in Intonation which was also the case in individuals' song judgment. Compared to the results of individual assessment, the inter-rater reliability is much higher in group assessment. Increasing tiredness of the raters might be the main reason for the inconsistency of judgments between the individual and group rating tasks as they were asked to score many cases for the individuals and far fewer in the group context.

Table 5.12   Means and Standard Deviations for the Groups' Intonation Score on the Vocal Pattern Test in the Pretest, Mid-test and Posttest

	Pretest		Mid-test		Posttest	
	Means	SD	Means	SD	Means	SD
Group 1	1.61	.25	2.44	.75	4.72	1.48
Group 2	2.17	.94	4.83	.75	7.06	.53
Group 3	2.11	.27	5.28	.25	7.06	.25

Note: The mean values across the six vocal patterns (each mean value consists of the mean of the scores awarded by the three raters across all vocal patterns).

Intonation

Table 5.12 presents means and standard deviations for the groups' intonation score on the vocal patterns in the pretest, mid-test and posttest. Compared to Group 2 (M=2.17, SD=0.94) and Group 3 (M=2.11, SD=0.27), Group 1's mean score (M=1.61, SD=0.25) was slightly lower in the pretest. Group 2's mean rating (M=4.83, SD=0.75) was twice as large as that of Group 1 (M=2.44, SD=0.75) and a little lower than that of Group 3 (M=5.28, SD=0.25) in the mid-test. Group 2 (M=7.06, SD=0.53) performed as well as Group 3 (M=7.06, SD=0.25) and much better than Group 1 (M=4.72, SD=1.48).
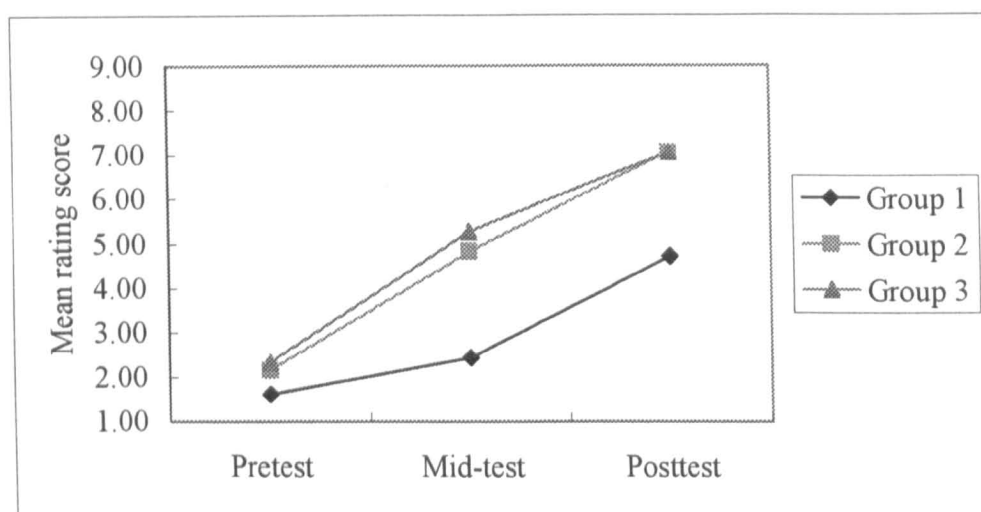
Figure 5.4 shows the improvement curve for Intonation on vocal pattern tests across the three groups in the pretest, mid-test, and posttest. There was a steady increase in Groups 2 and 3 from the pretest to posttest. Group 2 performed as well as Group 3 at

all stages of testing. Compared to Groups 2 and 3, Group 1's improvement range is much smaller, however, this showed a gradual rise from pretest to mid-test and then a steady increase from mid-test to posttest. These findings suggest that groups who had received movement or/and gesture training (Groups 2 and 3) improved their intonation, steadily improving from "poor"(rating scale=1) to "very good" (rating scale=7); whereas the improvement range is very limited for Group 1 (who moved from "poor" to "fair"(rating scale=5)).

Figure 5.4   The Improvement Curve for Intonation on Vocal Pattern Tests Across the Three Groups in the Pretest, Mid-test, and Posttest

A repeated-measures ANOVA was performed to examine the intonation achievement in relation to the between-subjects factor of Groups (taught by TT1, TT2 and TT3), and within-subjects factor of test Stages (pretest, mid-test, and posttest). The null hypothesis was that there is no difference between the three training techniques on the three groups' vocal pattern intonation score. Results of this analysis are summarised in Table 5.13. The main effect of Group was found [$F_{(2,15)} = 23.089$, $p < .001$]. Sidak *post hoc* analysis showed that there was a difference between Group 1 and 2; and Group 1 and 3. Therefore, the null hypothesis was rejected, which suggests that groups who had received gesture or/and movement training performed better in Intonation on vocal

Table 5.13   Summary of Repeated Measures ANOVA for Groups'
Intonation Score on Vocal Pattern Test

Source	Sum of Squares	df	Mean Square	F	p
Group	40.078	2	20.039	23.089	0.000***
Stage	167.609	2	83.805	234.075	0.000***
Group*Stage	10.687	4	2.672	7.463	0.000***

***$p<.001$

patterns than those who had not. In addition to main effect of Group, it also showed the main effect of test Stage [$F_{(2,30)}= 234.075$, $p<.001$]. Sidak *post hoc* analysis revealed a significant difference between pretest and posttest; mid-test and posttest; and pretest and posttest. There was a significant interaction [$F_{(4,30)} = 7.463$, $p<.001$] between Group and Stage. This interaction was further investigated using one-way ANOVA. It showed that there was no significant difference between the three groups in the pretest. This may be explained that these groups' intonation ability was similar before training. However, there was a significant difference between three groups in the mid-test and posttest. Sidak *post hoc* analysis revealed the significant difference between Group 1 and Group 2; and also between Group 1 and Group 3 in the mid-test and posttest. Because of the significance found in the mid-test, this implies that the effect of movement or/and gesture training to improve intonation on vocal patterns had appeared after only twelve sessions' instruction (about two months).

Tone Quality

Table 5.14 shows means and standard deviations for groups' tone quality scores of vocal patterns in the pretest, mid-test and posttest. The mean score of Group 1 was 2.22 (SD=0.54), that of Group 2 was 2.44 (SD=0.34) and that of Group 3 was 2.33 (SD=0.84) in the pretest. Group 3 scored (M=7.06, SD=0.49) higher than Group 2 (M=5.56, SD=0.98) and much higher than Group 1 (M=2.72, SD=1.06) in the mid-test. Similar to mid-test, Group 3 performed (M=7.11, SD=0.50) better than Group 2 (M=4.94,

SD=0.71) and much better than Group 1 (M=2.61, SD=0.25) in the posttest.

Table 5.14 Means and Standard Deviations for Groups' Tone Quality Score of Vocal Pattern Test in Pretest, Mid-test and Posttest

	Pretest		Mid-test		Posttest	
	Means	SD	Means	SD	Means	SD
Group 1	2.22	.54	2.72	1.06	2.61	.25
Group 2	2.44	.34	5.56	.98	4.94	.71
Group 3	2.33	.84	7.06	.49	7.11	.50

Note: The mean values across the six vocal patterns (each mean value consists of the mean of the scores awarded by the three raters across all vocal patterns).
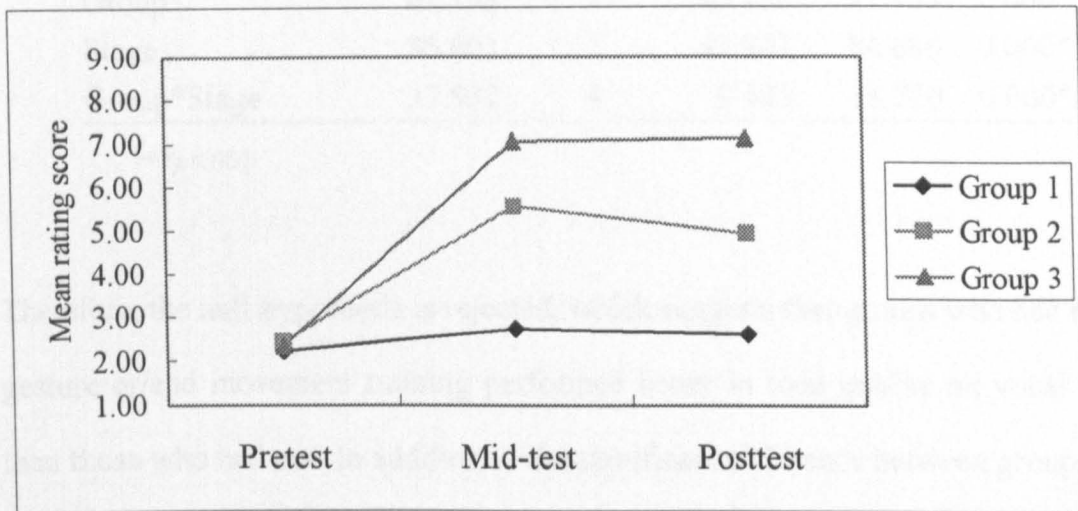
Figure 5.5 The Improvement Curve of Tone Quality on the Vocal Pattern Test Across the Three Groups in the Pretest, Mid-test, and Posttest

Figure 5.5 illustrates the improvement curve of tone quality on the vocal pattern across the three groups in the pretest, mid-test, and posttest. It can be seen that Group 1's improvement curve from pretest to posttest plateaus. Group 2 had an increase from pretest to mid-test, but a slight decline from mid-test to posttest. Whereas Group 3 had a sharply rising curve from pretest to mid-test but only a very minimal increase from mid-test to posttest.

The null hypothesis is that there was no difference between the three training techniques for the three groups' tone quality on vocal pattern scores. A repeated-measures ANOVA was carried out on the data. As shown in Table 5.15, the main effect of Group was significant [$F_{(2,15)}$ = 97.955, $p < .001$]. The Sidak *post hoc* analysis showed that there was a difference between Group 1 and 2; a difference between Group 1 and 3; and also a difference between Group 2 and 3.

Table 5.15 Summary of Repeated Measures ANOVA for Groups' Tone Quality Score on Vocal Pattern Test

Source	Sum of Squares	df	Mean Square	F	*p*
Group	81.105	2	40.552	97.955	0.000***
Stage	85.801	2	42.901	84.686	0.000***
Group*Stage	37.932	4	9.483	18.720	0.000***

***$p < .001$

Therefore, the null hypothesis is rejected, which suggests that groups who had received gesture or/and movement training performed better in tone quality on vocal patterns than those who had not. In addition to the significant difference between groups, it also showed the significant difference between testing Stages [$F_{(2,30)}$ = 84.686, $p < .001$]. Sidak *post hoc* analysis revealed the significant differences between pretest and mid-test; and pretest and posttest. However, differences between mid-test and posttest were not found. This suggested that choral tone quality improved faster in the earlier stages of instruction but then perhaps needed more rehearsal time to see progress at a later stage. Alternatively, it may also have reached a peak; as a result, the progression was not significant in the later stage. The interaction of Group and Stage was also significant [$F_{(4,30)}$ = 18.720, $p < .001$]. One-way ANOVA was used for testing simple effects. It showed that there was no significant difference across the three groups in the pretest. This may be explained in that these groups' tone quality was similar before

training. However, there was a significant difference between three groups in the mid-test and posttest. The Sidak *post hoc* analysis showed a significant difference between Group 1 and Group 2; Group 1 and Group 3; and, Group 2 and Group 3 in the mid-test and posttest. Group 3 not only performed better than Group 1 but also better than Group 2. It again proved the powerful effect of combining of Gesture and Movement training in improving choral tone quality on vocal patterns. The significant effect already achieved in the mid-test suggests that gesture or/and movement training are effective in improving choral tone quality on vocal patterns, which had changed after twelve sessions' instruction (about two months).

Comparison of 'Intonation' and 'Tone quality' in Groups at Different Stages

As shown in Figure 5.6, generally speaking, it can be seen that the improvement in intonation was steadily increasing in all three groups, but that of tone quality increased very quickly initially, and then falls further after this earliest stage. The possible reason for this could be that it is easier to develop choral tone quality than intonation for
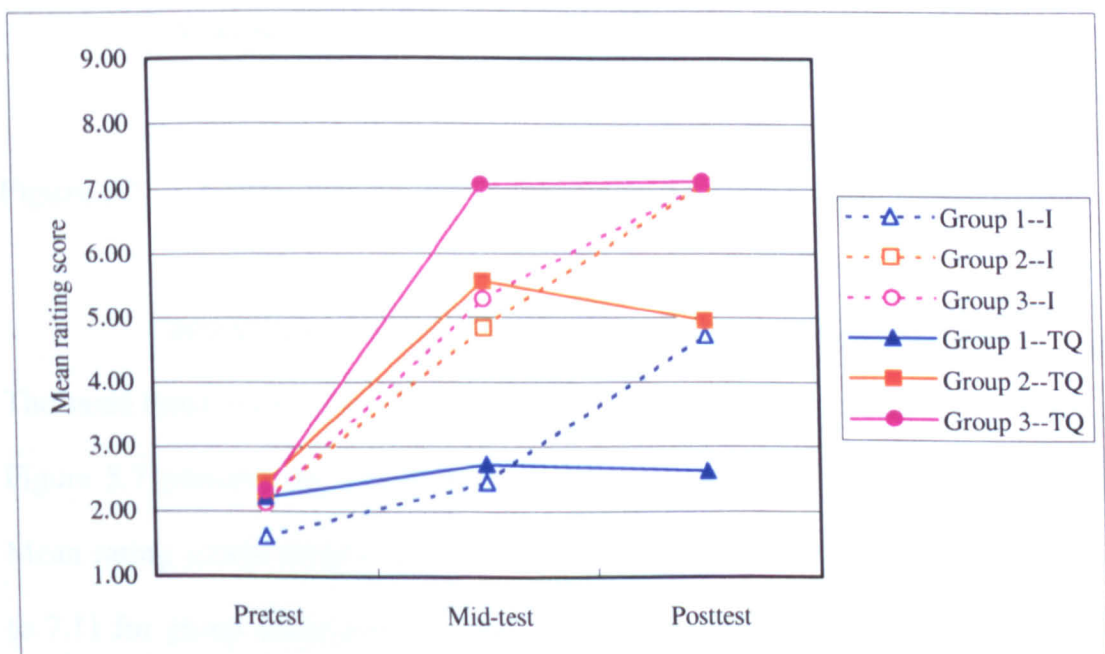
Figure 5.6 Comparison of Groups' "Intonation" and "Tone Quality" in Vocal Pattern Test at Different Stages

beginning choirs. Besides, it could imply that gesture or/and movement training can help children to develop tone quality at the earlier stage but it may take a longer time to progress more at later stages. As earlier findings revealed, Group 3 performed significantly better than Group 2 in Tone Quality at the earlier stage but revealed a similar trend in Intonation. The reason may be that the combination of gesture and movement training (TT3) in an earlier stage could help groups to build their tone quality quickly.
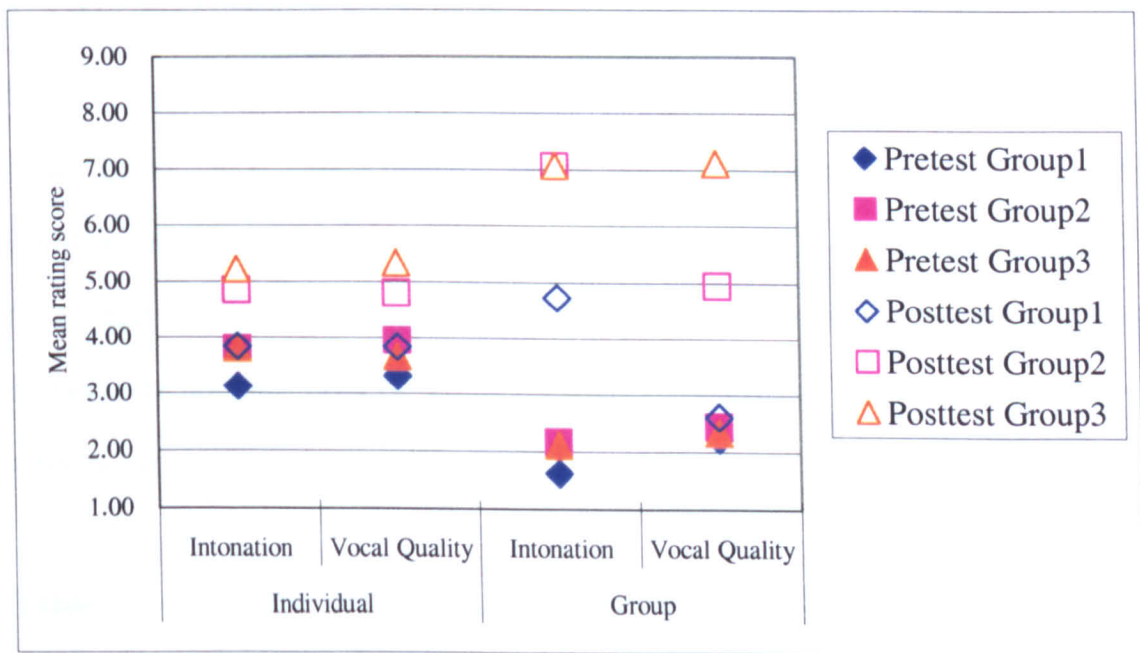
Figure 5.7   Comparison of Raters' Rating Range in Individuals and Groups

Comparison of Raters' Rating Range in Individuals and Groups

The same three raters were asked to judge the vocal patterns for individuals and groups. Figure 5.7 presents the comparison of raters' rating range in individuals and groups. Mean rating scores ranged from 3.12 to 5.33 for individual assessment and from 1.61 to 7.11 for group assessment. It can be observed that raters gave a very narrow range for individual assessments. In contrast, they gave a wider range (from 1 to 8 on average) for group assessments. Therefore, it is easier to see the effects of training on

choral singing than in individual singing. Raters seldom gave a score over 8 (very good to excellent). It seems that perhaps the raters kept the singers' improvement capacity in mind.

Group: Excerpts

Five excerpts were tested to examine whether or not the children could apply gesture techniques in singing songs especially in more difficult passages. Four expert raters were asked to rate the three groups' Intonation and Tone Quality. The results of the first three raters reveal significantly correlated at the 0.01 level (2 tailed) in judging Intonation and Tone Quality across all five excerpts. The inter-rater reliability of Raters 1 and 2 was 0.834, that of Raters 1 and 3 was 0.813, and that of Raters 2 and 3 was 0.874 in Intonation; reliability of Raters 1 and 2 was 0.853, that of Raters 1 and 3 was 0.786, and finally, that of Raters 2 and 3 was 0.806 in Tone Quality. Rater 4's rating scores were not used because analysis of inter-reliability in comparison with the other three raters showed a lack of correlation.

Table 5.16 Means and Standard Deviations for Groups' Intonation Score of Excerpts in the Pretest, Mid-test and Posttest

	Pretest		Mid-test		Posttest	
	Means	SD	Means	SD	Means	SD
Group 1	1.53	.69	2.47	.87	3.80	.84
Group 2	2.26	.15	5.93	.76	6.73	.64
Group 3	1.87	.50	5.40	.86	6.93	.83

Note: The mean values across the five excerpts (each mean value consists of the mean for the scores awarded by the three raters across all excerpts).

Intonation

Table 5.16 illustrates the means and standard deviations for groups' intonation score of excerpts in the pretest, mid-test and posttest. Group 2 (M=2.26, SD=0.15) was slightly

higher than Group 1 (M=1.53, SD=0.69) and Group 3 (M=1.87, SD=0.50) in the pretest.

Group 2's mean rating (M=5.93, SD=0.76) was twice as large as Group 1's (M=2.47,

SD=0.87) and a little different from Group 3 (M=5.40, SD=0.86) in the mid-test. Finally,

Group 2 (M=6.73, SD=0.53) almost performed as well as Group 3 (M=6.93, SD=0.83)

and much better than Group 1 (M=3.80, SD=0.84). However, it showed a very

consistent result in groups' intonation achievement in vocal patterns and excerpts.

Table 5.17   Summary of Repeated Measures ANOVA for Groups'
Intonation Score on Excerpts

Source	Sum of Squares	df	Mean Square	F	p
Group	51.282	2	25.641	45.419	0.000***
Stage	121.667	2	60.834	124.216	0.000***
Group*Stage	15.663	4	3.916	7.996	0.000***

***p<.001

A repeated-measures ANOVA was carried out on the data in relation to the

between-subjects factor of Group (taught by TT1, TT2 and TT3), and within-subjects

factor of Stage (pretest, mid-test, and posttest). The null hypothesis here was that there

is no difference between the three training techniques on three groups' excerpt

Intonation scores. A shown in Table 5.17, the results showed a significant effect of

Groups [$F_{(2,12)}$= 45.419, p<.001]. Sidak *post hoc* test revealed the difference between

Groups 1 and 2, and also Groups 1 and 3. No significant difference was found between

Groups 2 and 3. Therefore, the null hypothesis was rejected, which might be noted that

the groups who received gesture or/and movement training performed better in

Intonation on excerpts than those who did not. In addition to the significant differences

of Groups, the main effect of Stages was also found [$F_{(2,24)}$= 124.216, p<.001]. A Sidak

post hoc analysis showed that there was a difference between pretest and posttest,

mid-test and posttest, and finally pretest and posttest. There was a significant

interaction [$F_{(4,24)}$ = 7.996, $p<.001$] between Group and Stage (see Figure 5.8). Follow-up ANOVA analyses showed that there was no significant difference in the pretest. There was a significant difference among the three groups in the mid-test and posttest. Sidak *post hoc* analysis revealed the significant difference between Group 1 and Group 2; and also between Group 1 and Group 3 in the mid-test and posttest. According to significance found in the mid-test, it seems that gesture or/and movement training is not only a powerful approach to improve intonation in difficult passages but also an efficient way to see the effect.
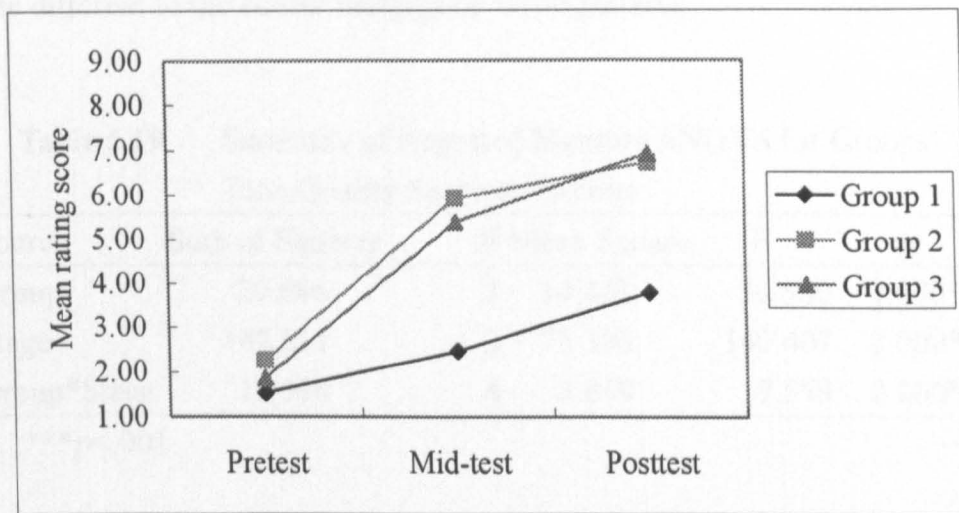
Figure 5.8   The Interaction of Groups and Stages on Excerpt Intonation

Table 5.18   Means and Standard Deviations for Groups' Tone Quality Score of Excerpts in the Pretest, Mid-test and Posttest

	Pretest		Mid-test		Posttest	
	Means	SD	Means	SD	Means	SD
Group 1	2.20	.38	3.51	1.34	4.80	.69
Group 2	2.13	.38	6.47	.56	7.20	.56
Group 3	2.27	.36	6.27	.60	7.07	.76

Note: The mean values across the five excerpts (each mean value consists of the mean for the scores awarded by the three raters across all excerpts).

Tone Quality

Table 5.18 shows means and standard deviations for groups' tone quality scores of excerpts in the pretest, mid-test and posttest. It can be observed that the three groups performed equally well in the pretest. The mean score of Group 1 was 2.20 (SD=0.38), that of Group 2 was 2.13 (SD=0.38) and that of Group 3 was 2.27 (SD=0.36). Group 2's mean rating (M=6.47, SD=0.56) was slightly better than Group 3 (M=6.27, SD=0.60) and much better than Group 1 (M=3.51, SD=1.34) in the mid-test. Similar to mid-test, Group 2 (M=7.20, SD=0.56) scored a little bit higher than Group 3 (M=7.07, SD=0.76) and much higher than Group 1 (M=4.80, SD=0.69) in posttest. However, the results were quite different to the earlier findings on vocal patterns.

Table 5.19 Summary of Repeated Measure ANOVA for Groups' Tone Quality Score on Excerpt

Source	Sum of Squares	df	Mean Square	F	p
Group	29.686	2	14.843	36.580	0.000***
Stage	142.611	2	71.306	140.407	0.000***
Group*Stage	15.396	4	3.849	7.579	0.000***

***$p<.001$

The null hypothesis was that there is no difference between the three training techniques on three groups' tone quality of excerpt scores. Similar to Intonation, a repeated-measures ANOVA shown in Table 5.19 indicated a significant difference between the three Groups [$F_{(2,12)}$ = 36.580, $p<.001$]. Sidak *post hoc* analysis revealed that there was a difference between Groups 1 and 2; and also between Groups 1 and 3. Therefore, the null hypothesis was rejected, which suggests that groups who received gesture or/and movement training performed better in tone quality on excerpts. In addition to the significant difference between the Groups, it also showed the significant difference among testing Stages [$F_{(2,24)}$ = 140.407, $p<.001$]. Sidak *post hoc* analysis showed the significant differences between pretest and mid-test, between mid-test and

posttest, and also between pretest and posttest. The interaction of Group and Stage was also significant [F $_{(4,24)}$= 7.579, p<.001] (see Figure 5.9). One-way ANOVA showed that there was no significant difference between the three groups in the pretest. However, there was a significant difference among three groups in the mid-test and posttest. Sidak *post hoc* analysis indicated the significant difference between Group 1 and Group 2; and also Group 1 and 3 in mid-test and posttest According to these findings, it can be inferred that gesture or/and movement training indeed showed a very positive effect in choral singing.
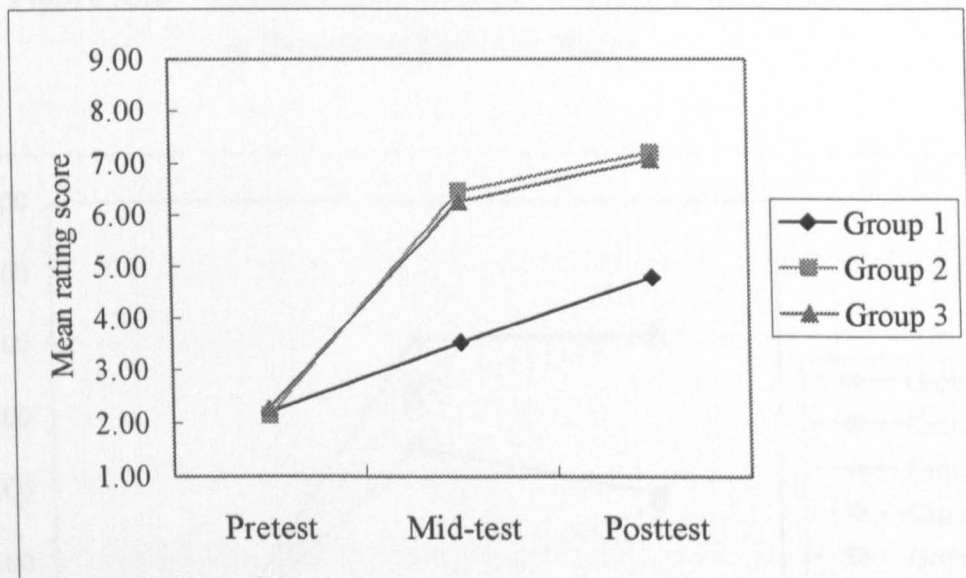
Figure 5.9   The Improvement Curve of Tone Quality on Excerpts
Among three Groups in Pretest, Mid-test, and Posttest

Comparison of Groups' 'Intonation' and 'Tone Quality' in Excerpt Test at Different Stages

As shown in Figure 5.10, generally speaking, it can be seen that the trends were very similar both in Intonation and Tone Quality, while the mean scores of tone quality were a little higher than those of intonation in every group. One possible reason for this could be that it is easier to develop choral tone quality than intonation by using the song approach for beginning choirs. However, the results of excerpts showed a complete contrast to those of vocal patterns.
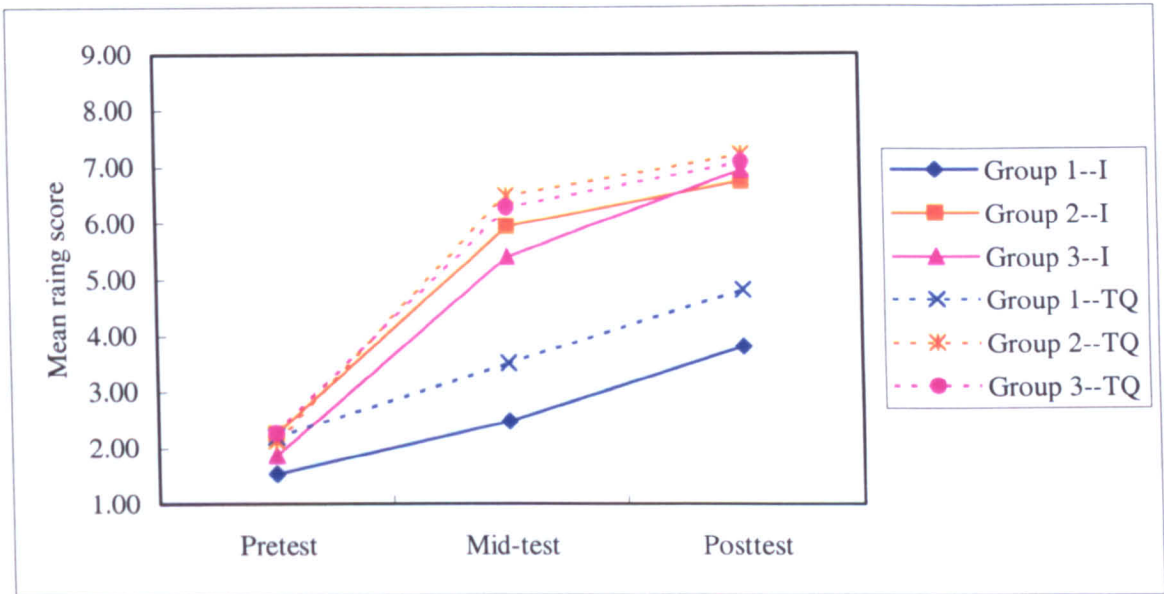
Figure 5.10 Comparison of Groups' 'Intonation' and 'Tone Quality' in Excerpts at Different Stages
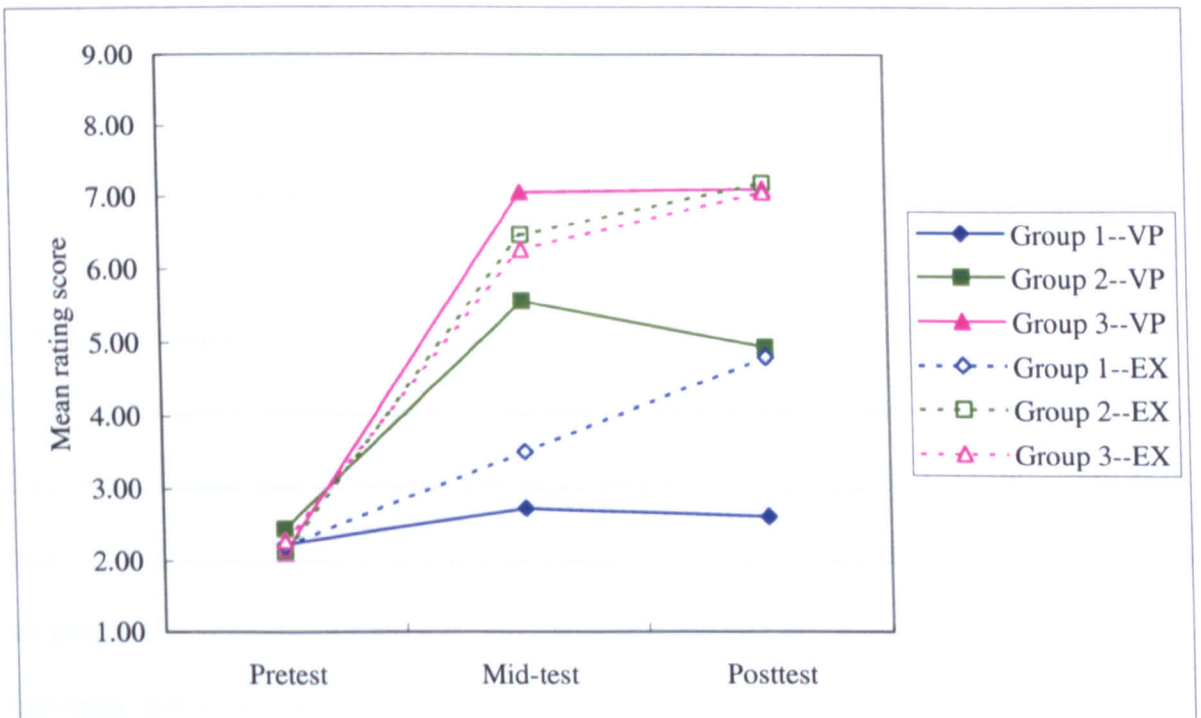
Figure 5.11 Comparison of Tone Quality's Learning Trend in 'Vocal Pattern' and 'Excerpt' Tests among Three Groups

Comparison of Tone Quality Learning Trend in 'Vocal Pattern' and 'Excerpt' among Three Groups

The results showed a high consistency between group Vocal Pattern and Excerpt tests in Intonation. However, those in Tone Quality illustrated some differences. Figure 5.11

presents the comparison tone quality learning trend in Vocal Pattern and Excerpt across the three groups. Although the raters in judging Vocal Patterns and Excerpts were different, the following analysis shows a very important finding. In Group 1, the excerpt trend was a gradual rise, but the vocal pattern trend plateaus. Similarly, Group 2's excerpt trend gradually increased but then decreased at a later stage in vocal pattern. One possible reason could be that groups are more confident in singing one short melody with some texts (Excerpts) rather than short vocal exercises (Vocal Patterns). All three groups showed the greater improvement in Vocal Pattern at the earlier stage, but less improvement at the later stage. This could be because that in the earlier stages of choral training the focus is on vocal exercises to develop vocal techniques; as a result, choirs improve more in the earlier stage in vocal warm up sessions. Further, it seems that there was a steady improvement at the later stage in Excerpt parts. Correspondingly, it may be that choral training focuses on vocal development through the song approach, therefore, the steady improvements were still observed at the later stage.

Group: Song

In order to know whether gesture techniques could apply when singing songs, one Chinese art song was chosen to test three choirs' achievement in intonation and tone quality. The three raters, who were the same as in the excerpts assessment, were asked to judge the groups' abilities in singing the Chinese art song. The inter-reliability between the three raters was significantly correlated. The inter-rater reliability of Raters 1 and 2 was 0.876, that of Raters 1 and 3 was 0.872, and that of Raters 2 and 3 was 0.823 in Intonation; reliability of Raters 1 and 2 was 0.864, that of Raters 1 and 3 was 0.832, and finally, that of Raters 2 and 3 was 0.768 in Tone Quality. According to the above results and earlier findings, the conclusions related to inter-rater reliability in this study are:

1. Raters were more consistent in evaluating Intonation than Tone Quality. It may be assumed that tone quality judgment is perhaps a more subjective feature to assess.

2. Raters were more consistent in evaluating Group (18 trials in judging vocal patterns) than Individual (267 trials in judging vocal patterns). In other words, the more tasks the raters need to judge, the lower the reliability between raters. Therefore, tiredness in judgment may be one of the critical factors to causing low reliability.

3. Raters were more consistent in evaluating Song (50 seconds averagely) and Excerpt (10 to 25 seconds) than Vocal Pattern (2.5 to 7 seconds). To be precise, the more time given, the better the reliability between the raters. It is suspected therefore that the actual vocal patterns given to the children were rather short and therefore did not give raters sufficient time to make an accurate judgment.

Intonation

As shown in Figure 5.12, the three groups' intonation ability in pretest was almost the same (Group 1=1.33, Group 2=1.67, Group 3=1.42). Group 3 (M=4.50) performed better than Group 2 (M=4.25), and than Group 1 (M=3.08) in the mid-test. However, Group 2 (M=6.83) sang as well as Group 3 (M=6.83) and much better than Group 1 (M=4.33). It may be inferred that gesture training improves choral intonation in singing songs. Unlike in the case of the excerpts, the improvement tendency was steadily increasing in all groups at all different testing times. However, the progression range of the control group was much smaller than those of the experimental groups.
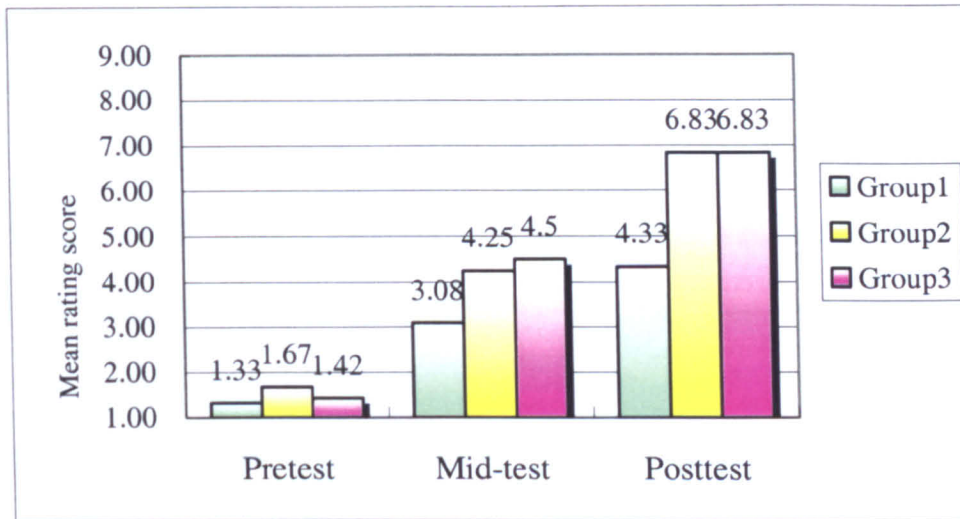
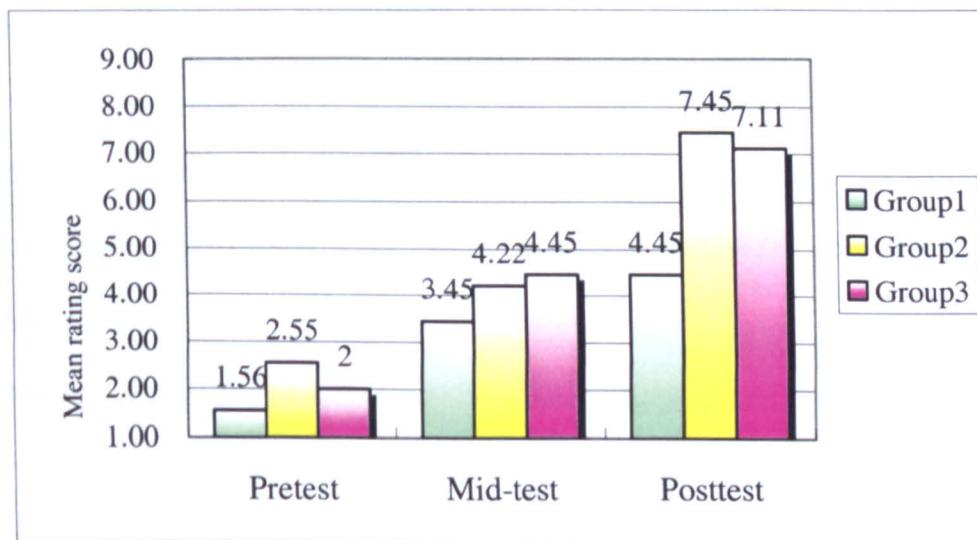**Figure 5.12** Mean Rating Scores of Group' Intonation in Singing a Song

Figure 5.13 Mean Rating Scores of Groups' Tone Quality in Singing a Song

Tone Quality

Figure 5.13 shows the mean rating scores in the three groups. It can be seen that Group 2's tone quality (M=2.55) was slightly better than Group 3 (M=2.00) and than Group 1 (M=1.56). Group 3 (M=4.45) performed a little better than Group 2 (M=4.22) and Group 1 (M=3.45) in the mid-test. However, Group 3's performance (M=7.11) was almost equal to that of Group 2 (M=7.45), but it was much better than that of Group 1 (M=4.45). According to the improvement trend, it could be implied that gesture training effects in improving tone quality are greater in the final stage for song singing.

Summary of Results

A one-way analysis of covariance, using the pretest score as a covariate, was used to examine the differences between the three training techniques in Intonation and Tone Quality for individuals, while a repeated-measures ANOVA was used to investigate the differences between the three training techniques in Intonation and Tone Quality for groups. The results showed significant differences between the three training techniques both in Individual and Group measurements. The following summarises the significance of sub-findings, which were analysed in this chapter.

Individual

1. After training, there was a significant difference between Groups 1 and 2; and also between Groups 1 and 3 both for Intonation and Tone Quality in individual Vocal Pattern test. Group 3 performed as well as Group 2 but much better than Group 1.

2. There was a significant difference between Groups 1 and 3 both for Intonation and Tone Quality in individual Song test. Group 3 scored higher than Group 1.

3. The significant difference on vocal pattern intonation improvement was found between Groups 1 and 3; whereas tone quality improvement was found between Groups 1 and 3, and also Groups 2 and 3. Group 3 improved more than Group 1 in Intonation; and more than Group 1 and 2 in Tone Quality.

4. The more difficult the vocal patterns (VP3 & VP5) are, the more progression the experimental Groups (Groups 2 and 3) made.

Group

5. No significant difference was found in the pretest for three Groups in all different kinds of Group testing. This may be explained in that children's singing abilities were similar before training.

6. There was a significant difference between Groups 1 and 2; and between Groups

6. There was a significant difference between Groups 1 and 2; and between Groups 1 and 3 in Intonation on group vocal pattern test. Groups 2 and 3 performed better than Group 1. A significant difference was found between Groups 1 and 2, Groups 1 and 3, and also Groups 2 and 3 in Tone Quality on group vocal pattern test. Group 3 scored higher than Group 2 and then higher than Group 1.

7. There were significant differences between Groups 1 and 2; and also Groups 1 and 3 both in Intonation and Tone Quality on group excerpt test in the mid-test and posttest. However, all three groups achieved a higher score on Tone Quality than on Intonation.

8. Group 2 and Group 3 performed better than Group 1 in Intonation and Tone Quality on the group song test in both mid-test and posttest. And the improvement trends were increased steadily from pretest to posttest in all groups.

Inter-rater reliability

9. Raters were more consistent in evaluating Intonation than Tone Quality; Group than Individual; and Song and Excerpt than Vocal Pattern.

5.2 Discussion of Findings

Individual: Vocal Pattern

The findings indicated that the children who had received gesture and/or movement training (Group 2 and Group 3) had a significantly higher achievement both in intonation and tone quality in the performance of vocal patterns than the children who had no gesture or movement training (Group 1). This is consistent with the literature presented in survey in Chapter 2 (McCoy, 1986; Mueller, 1993; Wis, 1993; Hibbard, 1994; Aylen, 1998; Kim, 2000; Chagnon, 2001), indicating that physical experiences serving three learning modes (visual, aural and kinesthetic) have a greater effect in facilitating children's vocal techniques.

Additionally, the student's enjoyment also enhances the learning motivation. Carlson (1983) found that fifth-grade children responded more favorably to their music programs when allowed to participate in movement activities as part of the learning process. Sims (1986) also found movement activities motivated students to show greater attentiveness. This also supported by Robinson and Winold (1976), McCoy (1986), Lewis (1988) and Taylor (1989) that the use of movement in the rehearsal can contribute to the singers' enjoyment of the rehearsal. According to my teaching notes and from the video observation, Groups 2 and 3 clearly showed more enthusiasm for singing and training as compared with Group 1. It is clear that movement training comprising different games raises the students' attitude toward singing and in the current study all the children in Groups 2 and 3 enjoyed their work.

Obviously 'learning' and 'practice' are potential factors influencing the results of any kind of teaching experiment (Borg, Gall, and Gall, 1993). The singers' initial singing ability may also affect the outcome. A student with a lower initial standard may progress relatively quickly through training. Although an already able child may benefit from training, this might be relatively hard to check because the room for improvement may not be so great. The main purpose of this current study was to compare the difference between the three training techniques. This was done statistically by using an adjusted score for the data analysis instead of comparing the improvement within each group. There is still the possibility that the three groups practised to different degrees. This possibility was controlled as far as possible by using the same pacing and contents for each group, and also the amount of singing done in each session was similar. Therefore, it seems unlikely that the highly significant effect of treatment (for vocal patterns combined it was $p < .001$) was due to different amounts of practice. Rather, we conclude that it was due to the intended test

variable of training techniques.

The results showed no significant difference between the children who had received gesture training only (Group 2) and those who have received gesture and movement training (Group 3) in both intonation and tone quality for vocal pattern tests. One reason for this might be found in Berger's (1999) research which showed that Dalcrozian approaches advocate learning pitch and harmony only after two years of Rhythmics instruction. In the current study, they were introduced to Dalcrozian approaches from scratch and so did not have a period of Rhythmics training before having to deal with pitch. Thus, they may not have had the correct base for movement development. However, Greenhead (2002), a Eurhythmics master, points out that an experienced Dalcroze teacher could make a significant effect in a shorter period compared to a less experienced teacher. It could be that perhaps my own training was slightly lacking. Another possibility could be that the vocal patterns were too easy or the test was not powerful enough to measure the differences in the children's intonation and tone quality. Given that all of these possibilities are viable, I have no firm answers. The last and perhaps the most important point is that the kinesthetic experience clearly has a powerful effect on intonation and tone quality. According to the research model (see Figure 4.1, p. 87) and other studies (Taylor, 1989; Hassemann & Jordan, 1991; Wis, 1993; Hibbard, 1994; Mead, 1994; Gordon, 1997; Greenhead, 2000; Chagnon, 2001), the students in the Group 2 and Group 3 seemingly had internalised the kinesthetic experience and perhaps as a result, no differences were found between them as they were both able to draw on the motor sensations equally successfully in their singing. According to my teaching notes, I reflected on the effect of each exercise and gesture and found that a simple gesture could have a very positive effect for both Groups 2 and 3. The children could sing successfully without gesture or only looking

at my gesture if the gesture was not too difficult. Therefore, it appears that the kinesthetic sensation of a hand gesture made no difference when singing a short melody.

Comparing the pre and post scores, it showed that Group 3 had improved significantly more than Group 2 in Tone Quality but not in Intonation. In addition, Group 3 gained a higher score in Tone Quality than in Intonation. According to Berger's (1999) research, the students who had received an Eurhythmics training also had a higher score on rhythm than pitch score. She explained that "kinesthesia may ultimately affect the clarity of images influencing pitch perception, but the effects of Eurhythmics may be much less direct and slower to achieve than the effects of body movement on the element of rhythm, which seems to be directly related to muscles (p.77)". Lewis (1988) confirms this and stated that, compared to rhythm, pitch is less closely allied with motion. In the Eurhythmics class (Group 3), the children used their energy and weight to explore the space and music by travelling through the whole body experience in line with works by Findlay (1971), Chosky et al. (1986), Wilson (1988), Mead (1994& 1996) and Caldwell (1995). Consequently, they were more sensitive to the music and this may have made them more ready to internalise the sensations of tone quality. We can certainly conclude that the combination of gesture and movement instruction was better for improving tone quality. However, no significant difference was found between Group 1 and 2. Thus, it may be inferred that the combination of gesture and movement instruction is the better way to improve Intonation and Tone Quality when children vocalise.

The results indicated that children's achievements differed in the five vocal patterns. It showed that Group 1 and Group 2 differed in VP4 and VP5 for Intonation and differed

in VP5 for Tone Quality; whereas Group 1 and Group 3 differed in VP2, VP3, VP4, and VP5 both for Intonation and Tone Quality. In addition, the more difficult the vocal patterns (VP3 and VP5), the more progress the children made. One possible explanation for this is that the more difficult tasks need more concentration. The focus of the attention is critical in any kind of learning and any learning stages (Caldwell, 1995). If children feel it is easy, they might make the gesture and sing carelessly. Therefore perhaps the gesture is more effective if the task is more difficult for the children. This may be seen as evidence that gesture did have a very positive effect for enhancing intonation and tone quality. By contrast, it might also imply that gesture is not always effective. More details of this possibility will be discussed in Chapter 7.

Individual: Song

Children's performance in song singing has shown that only the children who received gesture and movement training performed better than those who did not (G3>G1). As the findings shown above indicate, it could be concluded that the combination of gesture and movement training is better than the other two training techniques. The choral training focused on practising vocal patterns, therefore, the instruction effect on vocal pattern seems faster than that of song singing. Had the training period been longer, a significant difference between Groups 2 and 3, or Groups 1 and 2, might have been revealed.

Group: Vocal Patterns, Excerpts and Song

According to Kim (2000), the significant difference between the first-grade children who received movement instruction or not was only achieved after 10 weeks. In this current study, the effect of gesture and movement training was achieved in 12 weeks for grade-5 children. This suggests that a significant difference might have occurred earlier, but the mid-test only took place after 2 months.

Similar to the individual results, the effect of a combination of gesture and movement training was greater in tone quality. In addition, Group 3 improved dramatically in the earlier stage. As mentioned previously regarding individual performance, it might be because Group 3 got more of a sensation of specific qualities in their movement training. Therefore, they had a better sensation about tone quality.

Children's Group performance achievement in vocal patterns and excerpts were similar. This is supported by the research model that once the children practise the linking of voice and gesture, it can be applied to different repertoires.

Generally speaking, the training technique for gesture and movement showed a positive effect in that singing was found to improve. The improvement curves indicated a very complicated outcome in terms of group vocal pattern, excerpt and song test. In other words, the three groups, the different kind of tests and the vocal techniques all differed in the learning curve. In the choral intonation of vocal pattern, for example, the improvement curve of Group 1 showed a steady increase at an earlier stage but then a sharply rising improvement at the later stage; whereas that of Groups 2 and 3 showed a steady increase across the training period. The improvement curve for tone quality showed different trends with Group 1 displaying a very minimal progression; whereas Groups 2 and 3 had a steady improvement at an earlier stage but then a plateau at a later stage. Thus, it appears that the different teaching techniques, tasks, and vocal techniques have different critical periods. In addition, the transmodality of learning might also be different in the different groups. Group measurements in this study took place before training, after 14 sessions, and after 24 sessions. If the testing time differed, the results might have differed. According to my teaching notes, the performance in Group 3 sometimes improved and sometimes regressed due to a new exercise or movement activity being introduced. Sometimes

these children showed a very good 'translation' (transference from movement to singing) but sometimes they had negative effect due to their understanding not being fully developed. This finding is confirmed by Greenhead (2002) when she states that muscle improvement does not progress steadily. In this study it was not possible to trace a critical period of progress or a plateau in learning.

Although there was only a small data pool for the group test, the results indeed provided a positive insight for choral singing by using gesture and movement training.

CHAPTER 6

MOVEMENT TRAINING EFFECT

Chapter 5 has shown a very positive effect of the combination of gesture and movement training in enhancing children's intonation and tone quality. In order to explore the effects of training in more detail, a further set of tests were undertaken on Groups 2 and 3 only focusing on gesture and movement. The children were assessed at the end of the training programmes in their gesture use in song singing and this formed the basis of the data analysed in this chapter.

6.1 Results

In this data analysis, gesture performances were used to measure dependent variables of Gesture Quality: (1) Body Efficiency (score derived from the judges' observations to the fundamental requirements for an efficient body); (2) Mastery of Gesture Technique (based on judgments of how well each gesture was performed); and (3) Coordination of Voice and Gesture (judgment of how well the child blended the voice and gesture) (see details in Chapter 1, p. 8).

Three expert judges participated in rating the achievement of gesture when all the children sang a song. The judges had all test variables explained to them and undertook a number of practice trials before making the main study judgments. The video played with mute for judging Body Efficiency and Mastery of Gesture Technique; while it played with sound for judging Coordination of voice and gesture. A series of Pearson correlation tests were undertaken to assess the degree of correlation between the raters' scores. The results showed that the three raters were significantly correlated at 0.01

level (2 tailed) in Body Efficiency, Mastery of Gesture Technique, and Coordination of Voice and Gesture. The inter-rater reliability of Raters 1 and 2 was 0.699, that of Raters 1 and 3 was 0.610, and that of Raters 2 and 3 was 0.814 in Body Efficiency; reliability of Raters 1 and 2 was 0.665, that of Raters 1 and 3 was 0.673, and that of Raters 2 and 3 was 0.853 in Mastery of Gesture Technique; and finally, reliability of Raters 1 and 2 was 0.777, that of Raters 1 and 3 was 0.633, and that of Raters 2 and 3 was 0.793 in Coordination of Voice and Gesture. This showed a similar degree of inter-rater reliability to assessing individual song singing ability, which was shown in Chapter 5 (p.134).

Table 6.1 Means and Standard Deviations for Gesture Quality

	Group 2		Group 3	
	Mean	SD	Mean	SD
Body Efficiency	4.20	1.49	5.33	1.33
Mastery of Gesture Technique	4.24	1.48	5.37	1.55
Coordination of Voice and Gesture	4.06	1.76	5.00	1.56
Gesture Quality (Overall)★	**4.17**	1.53	**5.23**	1.44

★ *Overall score= (Body Efficiency+ Mastery of Gesture Technique+ Coordination of Voice and Gesture)/3*

Table 6.1 presents the means and standard deviations of Gesture Quality achievement in Groups 2 and 3. It can be seen that, generally speaking, Group 3 performed better than Group 2. The mean of Body Efficiency for Group 3 was 5.33 (SD=1.33), whereas that for Group 2 was 4.20 (SD=1.49). The mean of Mastery of Gesture Technique for Group 3 was 5.37 (SD=1.55), whereas that for Group 2 was 4.24 (SD=1.48). The mean of Coordination of Voice and Gesture for Group 3 was 5.00 (SD=1.56), whereas that for Group 2 was 4.06 (SD=1.76). Finally, the mean of Overall Gesture Quality for Group 3

was 5.23 (SD=1.44), whereas that for Group 2 was 4.17 (SD=1.53).
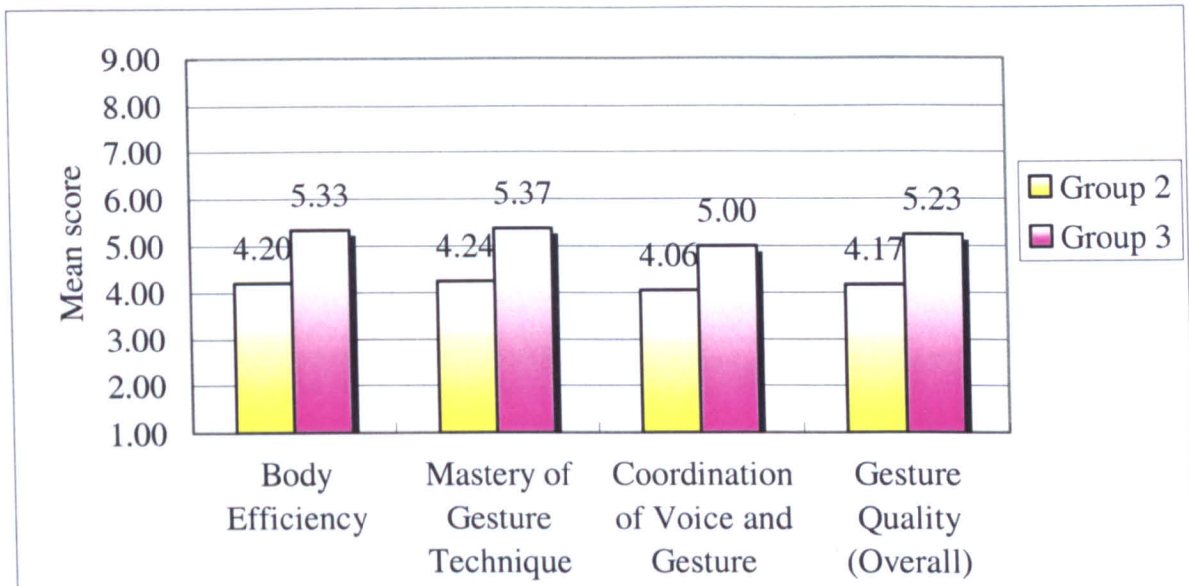
Figure 6.1   The Achievement of Gesture Quality in Groups 2 and 3

The achievement of Gesture Quality in Groups 2 and 3 is shown in Figure 6.1. The children performed equally well in Body Efficiency and Mastery of Gesture Technique but a little better than Coordination of Voice and Gesture in both groups. It is clear that Group 3 gained higher scores than Group 2 for every measurement item, suggesting that movement training facilitates final performance in gesture more than gesture training alone.

Gender is always a very popular topic for music education, especially for singing and movement. It can be seen from the Figure 6.2 when considered here, girls performed much better than boys both in Groups 2 and 3, in Body Efficiency, Mastery of Gesture Technique, and Coordination of Voice and Gesture. Girls in Group 2 gained very similar scores in each item, whereas girls in Group 3 scored slightly higher in Mastery of Gesture Technique than in Body Efficiency and Coordination of Voice and Gesture. The boys in Group 2 performed equally well in Body Efficiency and Mastery of Gesture

Technique but slightly better on Coordination of Voice and Gesture. The score of Body Efficiency was higher than Mastery of Gesture Technique and Coordination of Voice and Gesture for the boys in Group 3. Finally, it can be seen that, Overall, the gender difference in performance in Group 3 is greater than in Group 2.
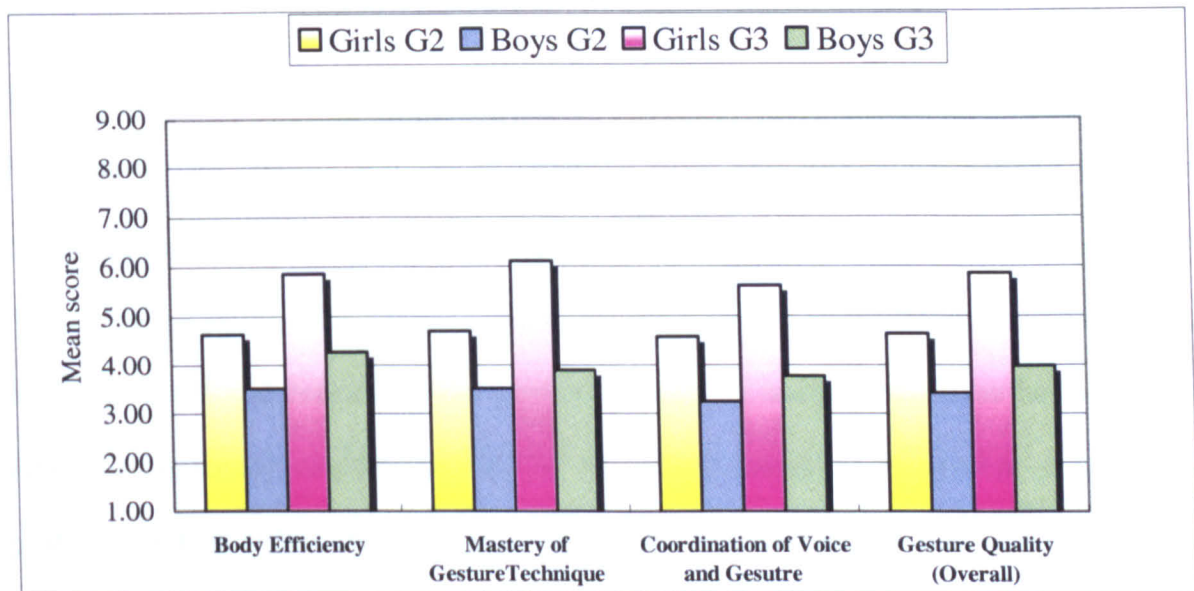
Figure 6.2 Comparison of Girls and Boys in the Performance of Gesture Quality

The main null hypothesis was:

H_0: There is no significant difference between children who receive gesture training on their gesture quality scores whether or not they have received movement training.

In order to understand the differences between Groups 2 and 3, t-tests were carried out. The results showed a significant difference between Groups 2 and 3 in Body Efficiency $[t_{(34)} = 2.396, p < .05]$, Mastery of Gesture Technique $[t_{(34)} = 2.242, p < .05]$ and Overall Gesture Quality $[t_{(34)} = 2.156, p < .05]$. Therefore, the null hypothesis was rejected, indicating that the children who have received movement training performed better than those who did not, as indicated in the gesture quality scores. Therefore, movement training did help children to build up their body functioning and improved their gesture

quality. However, the results also showed no significant difference between Groups 2 and 3 in Coordination of Voice and Gesture [$t_{(34)}$ = 1.704, p= .098]. Although no significant difference in Coordination of Voice and Gesture between the two groups was shown, the trend was for the group who had received movement training to perform slightly better than the group that had not received any movement training.

6.2 Discussion of Findings

Findings in this chapter add to the previous work that movement training enhances children's gesture quality. Empirical support for this may be drawn from the research of Roy-Dobeck (1995), who reports that movement stimulation can have a powerful effect on motor skills and concludes that general movement training improves has a positive effect in improving coordination skills, movement accuracy, movement synergy and posture holding. More specific evidence from the literature on movement training indicates that Daclroze Eurhythmics aims to develop students' inner muscular sense and to coordinate the ear, nervous and muscular systems, and the mind through whole body movement travelling through space (Findlay, 1971; Chosky, *et al.*, 1986; Wilson, 1988; Mead, 1994 & 1996; Caldwell, 1995; Benge, 1996; Greenhead, 2002); as a result, the students' bodies become more sensitive and effective in responding to music. Support for this by Dickson (1992) and McCoy (1994) has demonstrated that a conducting gesture can be more effective and expressive through Eurhythmics. In this sense, the Dalcrozian approach obviously will have contributed to the creation of better gesture qualities. Indeed, this study would support the idea of Dalcrozian training for young choristers.

Certainly, the children who received movement training scored higher in Body Efficiency than those who did not. This finding would then confirm Dalcroze and

additionally Alexander's philosophy. Balance is fundamental to a good movement (Preston-Dunlop, 1980). Oglethorpe (1996:65) also stresses that fine motor control can be satisfactorily achieved only when the body is correctly balanced. Eurhythmics games, e.g. walking four beats and then growing into the shape with four beats in one leg or passing a ball through a phrase, helps to build the body balance, centredness, grounding, control and coordination. Therefore, the children received Eurhythmics training resulting a better body functioning. It seems to be concluded that the importance of movement training needs to be included in choral singing.

The finding also indicated that movement training enhanced children's ability in the Mastery of Gesture Techniques. In other words, Group 3 performed a more accurate, expressive, flexible gesture and was better in sustaining a continuous movement than Group 2. Thus, it seems that better gross motor control (movement) can enhance fine motor agility (gesture). It is clear that it is more difficult to develop an effective gesture without developing the gross motor control. From this point of view, it is easier to understand why the students who have received gesture training did not perform as well as those who have received movement training. Eurhythmics games such as quick reactions which were used in this study also may have helped to develop the efficiency of gesture technique.

Although Group 3 scored significantly higher than Group 2 in Body Efficiency and Master of Gesture Technique, Coordination of Voice and Gesture was not significantly different. One possible explanation for this outcome is that the Coordination of Voice and Gesture involves two aspects of technique: both singing and motor coordination. The length of instruction might be insufficient to have a positive effect on a specific element. Movement training might, of course, take a longer time to become fully

developed and operational. Greenhead (2002) argued that it may take time for the Eurhythmics technique to be internalised in an earlier stage but once it is fully developed, the students will become much quicker in responding to music with Eurhythmics thought. Although not statistically significant, a clear and consistent trend is revealed in that the children who received movement training appear to gain a better score on the Coordination of Voice and Gesture.

CHAPTER 7

THE RELATIONSHIP BETWEEN

VOICE AND GESTURE

The effects of gesture and movement training in improving vocal techniques and gesture quality have been reported in Chapters 5 and 6. This chapter focuses especially on the relationship between Voice and Gesture for individuals in order to look in detail at how each child attempts to co-ordinate the two elements. Furthermore, it also discusses whether or not gesture is always effective, and whether there are any differences between boys and girls, while using gesture.

Children's singing performance with gesture formed the basis of the data analysis in this chapter. Each child received two different kinds of score for each action: a voice score and a gesture score. Three groups of raters were asked to judge the children's voice and gesture performances separately. The two groups of three raters who judged voice performance were the same as the raters in Chapter 5; and the three raters who judged gesture performance were the same as the raters in Chapter 6. Only an audio stimulus was provided to rate singing ability (Intonation and Tone Quality) although the children sang with gesture both for Vocal Pattern and Song. Video with mute was provided for rating Gesture Quality for Vocal Pattern. Video with mute was played for rating Body Efficiency and Mastery of Gesture Technique; whereas video with sound was played for rating Coordination of Voice and Gesture.

A series of Pearson correlations was undertaken to assess initially the degree of correlation between the raters. The inter-rater reliabilities are shown in Table 7.1. It can

be seen that all of them were significantly correlated at a 0.01 level. Again, the inter-rater reliability in VP6 was not significant, therefore it was removed from the presentation of the results.

Table 7.1 Inter-rater Reliability of Assessment for Children's Singing with Gesture on Intonation, Tone Quality and Gesture Quality

Raters	Dependent Variables	Raters 1 and 2	Raters 1 and 3	Raters 2 and 3
1st group	VP--Intonation	.599**	.607**	.527**
	VP--Tone Quality	.455**	.494**	.507**
2nd group	Song--Intonation	.732**	.755**	.845**
	Song--Tone Quality	.674**	.679**	.851**
3rd group	VP--Gesture Quality	.642**	.621**	.745**
	Song--Gesture Quality	.791**	.722**	.886**

Note: 1. **p<.01

2. Song—Sub items for Gesture Quality have been shown in Chapter 6 (p. 144-145).

This chapter is presented in two sections: (1) the relationship between Voice and Gesture and (2) how gesture may help the voice.

7.1 The Relationship Between Voice and Gesture

The voice score in this section was defined as the averaged scores for Intonation and Tone Quality.

Vocal Pattern

In order to discover the relationship between Voice and Gesture, Pearson correlations were used to analyse the data of voice and gesture scores to see whether the children who had a higher voice score also got a higher gesture score. If the children have received voice, gesture and movement training, these might be potential interference real association between Voice and Gesture. To avoid the training effect, therefore, only

the pretest scores were utilised for data analysis in this section.
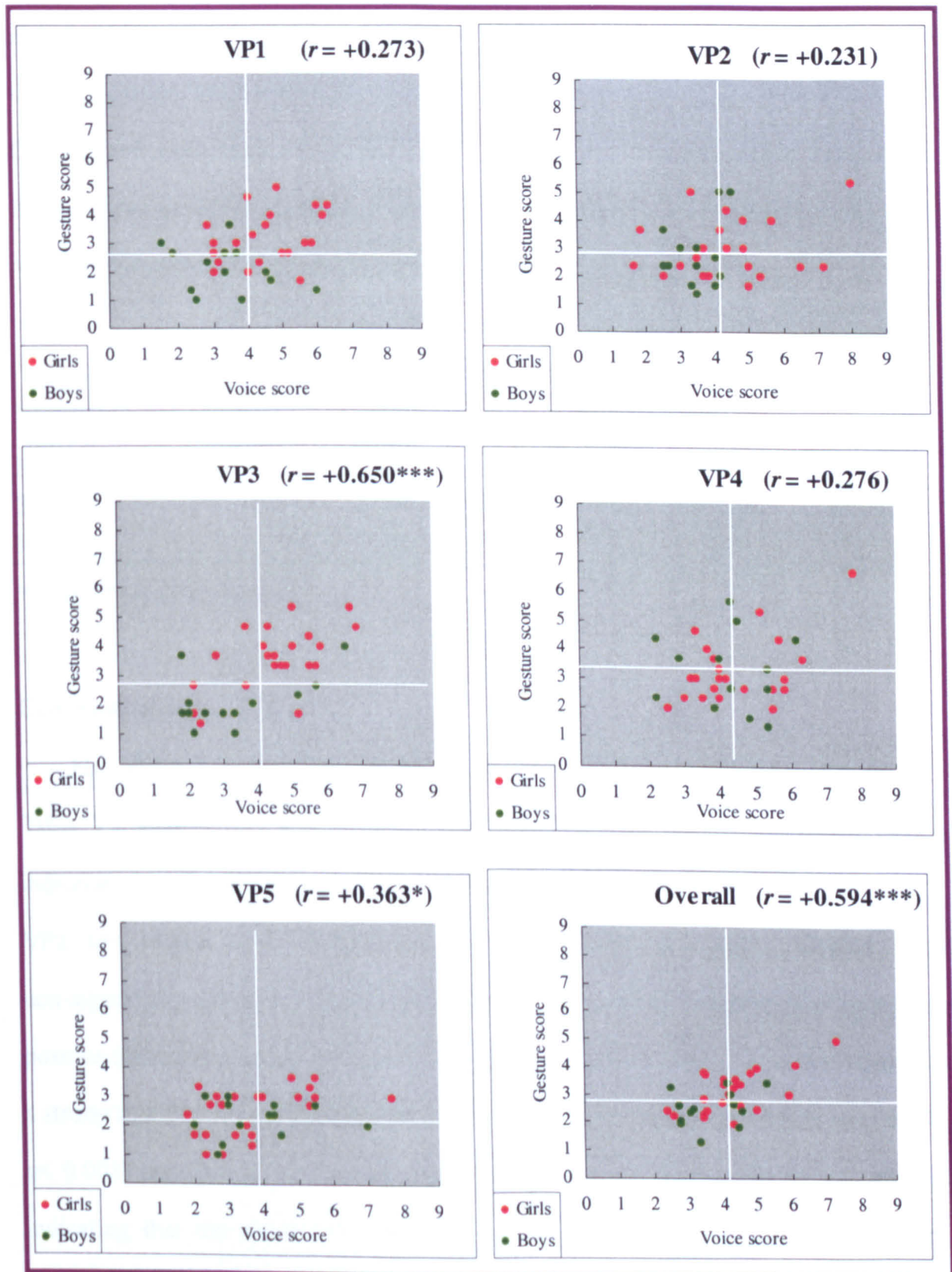
*p<.05; **p<.01;***p<.001

Figure 7.1   Correlations Between Voice and Gesture in Vocal Patterns

In these figures (Figure 7.1), the vertical and horizontal white lines divide both axes at their means. For example, the vertical line separates those children who were below the mean on voice from those who were above the mean. It can be seen these scattergrams that high gesture score tended to be associated with high voice scores in VP3, VP5 and Overall, and vice versa. In contrast, the condition in VP1, VP2 and VP4 differed. Nevertheless, generally speaking, all scatterplots showed positive correlations. Although all the correlations were not perfect, the trends were observed.

Table 7.2   Pearson Correlations Between Voice and Gesture in Vocal Patterns

	VP1	VP2	VP3	VP4	VP5	Overall
Pearson Correlation	0.273	0.231	0.650	0.276	0.363	**0.594**
Sig.	0.108	0.176	0.000***	0.103	0.029*	**0.000***
N	36	36	36	36	36	36

$*p<.05$; $**p<.01$; $***p<.001$

Conventionally the null hypothesis was:

H_0: There is no association between Voice and Gesture.

Table 7.2 shows the Pearson correlations between Voice and Gesture. The results indicated that the correlation between Voice and Gesture in VP1 ($r=$ +0.273, $p=$ 0.108), VP2 ($r=$ +0.231, $p=$ 0.176) and VP4 ($r=$ +0.276, $p=$ 0.103) showed weak non-significant positive associations, whereas there was a moderately significant positive association between Voice and Gesture in VP5 ($r=$ +0.363, $p<$ 0.05). There was a strong significant positive relationship between Voice and Gesture in VP3 ($r=$ +0.650, $p<$ 0.001) and Overall ($r=$ +0.594, $p<$ 0.001). Therefore, the hypothesis was rejected indicating that the significant correlation between Voice and Gesture indeed exists. These results are similar to those in Chapter 5 where, in the more difficult patterns (VP3 and VP5) there was more progression in the gesture and/or movements training groups than the control. Here in the more difficult patterns (VP3 and VP5) there was a

significant correlation with Voice and Gesture. The possible reasons for the different intensity (weak vs. strong) of the correlations across different vocal patterns could be:

1. The children were not familiar with the gestures or the vocal patterns.

2. The quality and appropriateness of gesture designed for particular patterns differed (this is discussed in more detail in page 175).

3. If the gesture is too complicated or comprises several motions (e.g. VP1 and VP2, gestures see Appendix E), children find it difficult to focus on Voice and Gesture.

4. The ways children use gesture differed. According to the supplementary questionnaire, 62.9% of children reported that their voice followed their gesture while singing with gesture; 28.6% of them reported that their gesture followed their voice; and 8.6% of them reported that they did not think about anything while singing with gesture. Because the ways in which they used gesture in singing varied, one type of child might focus too much on gesture, as a result, forget to concentrate on singing and vice versa.

According to questionnaire, 25.7 % of children expressed that they did not like singing with gesture: the majority of this group were boys. Because of the insistence that gesture was used in singing, a negative attitude may have arises, thereby affecting the pure association between Voice and Gesture. Therefore, gender might be a critical issue to be discussed.

If we look back at Figure 7.2, it can be seen that the majority of boys (green dots) were scattered in the bottom-left block in all vocal patterns. It is clear that, compared to girls, boys' performance in Voice and Gesture was less successful. In addition, many of boys were scattered in the top-left and bottom-right blocks which indicated weak or no association. Therefore, this may be interpreted to support that gender could be an

important factor affecting the association between Voice and Gesture.

When looked at separately girls showed significant correlations of Voice and Gesture with VP3, VP4 and VP5 (see Table 7.3). The increase in VP4 was such that it would

Table 7.3 Pearson Correlations Between Voice and Gesture for Girls and Boys

		VP1	VP2	VP3	VP4	VP5	Overall
Girls	Pearson Correlation	0.229	0.221	0.639	0.497	0.497	0.637
	Sig.	0.165	0.310	0.001**	0.016*	0.016*	0.001**
	N	23	23	23	23	23	23
Boys	Pearson Correlation	-0.310	0.274	0.502	-0.071	0.060	0.312
	Sig.	0.300	0.365	0.080	0.818	0.847	0.299
	N	13	13	13	13	13	13

$*p<.05$; $**p<.01$; $***p<.001$

appear that the boys were diluting this correlation. Since we had only 13 boys in total in this study, statistically only very strong correlations would be detected if they actually existed at all. Therefore it was hardly surprising that none of the patterns differed significantly from no correlation. However when we compare the different correlations between boys and girls for VP4, it is clear that the 'no relationship' of the boys was different from the 'positive correlation' found in the girls. Though not as strong, a similar pattern may be observed in VP5. In VP1 neither girls nor boys significantly differed from zero, yet there may be evidence for a different relationship between the girls and the boys, with the girls' correlation being weakly positive and the boys' weakly negative. However, no negative correlations were found for the girls. This would suggest that there were different associations of Voice and Gesture with vocal pattern between the boys and girls.

Song

The children were not used to using gestures whilst singing songs at the pretest stage. Therefore, the children were only asked to sing a song with gesture in the posttest. In other words, the posttest scores were used for this correlation analysis.
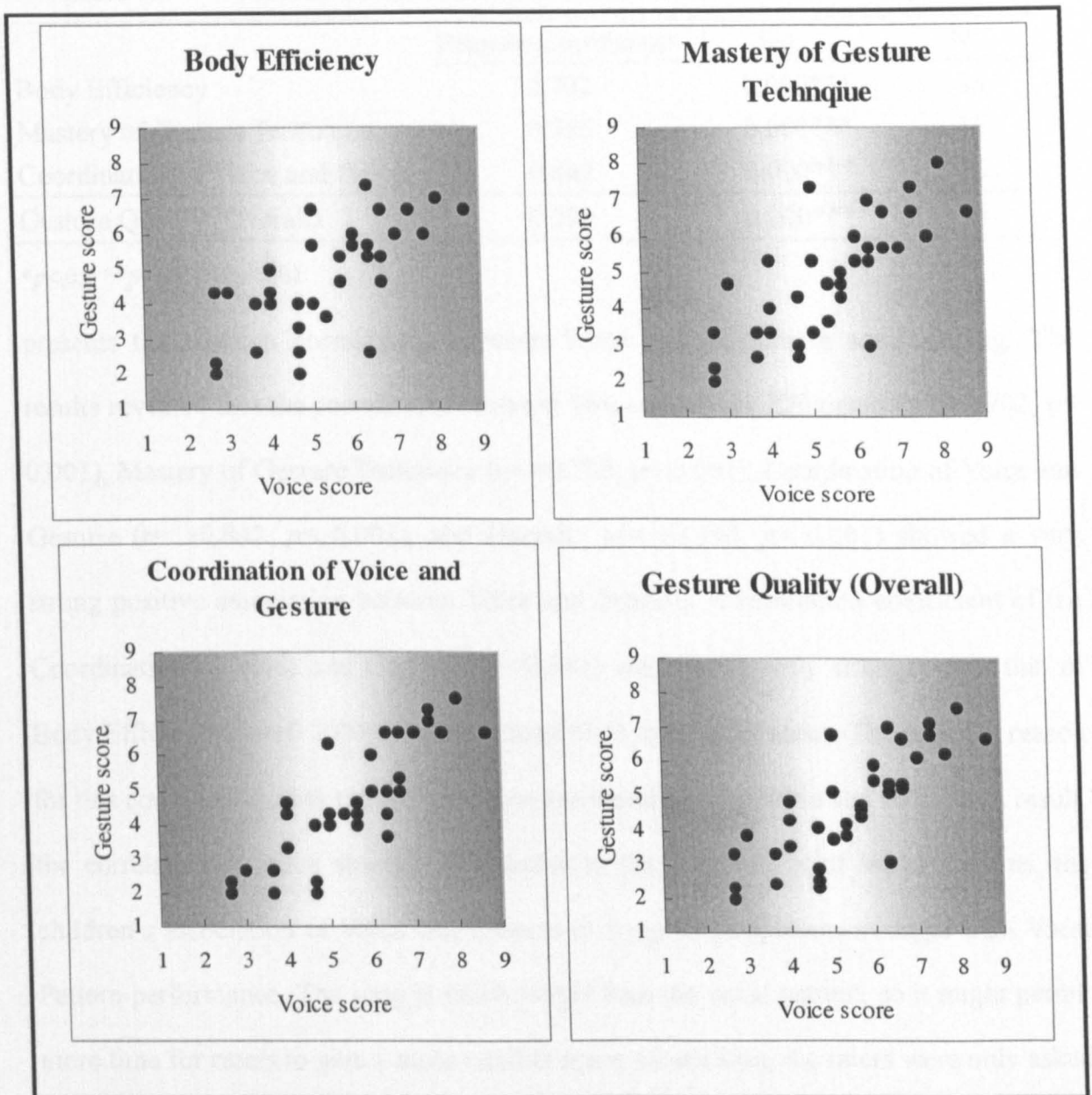
Note: *$p<.05$; **$p<.01$; ***$p<.001$

        Gesture Quality (Overall)= (Body Efficiency+Mastery of Gesture Technique+Coordination of Voice and Gesture)/3

        Each action (sing with gesture) has got one singing score and three different gesture quality scores.

Figure 7.2 Correlations between Voice and Gesture for Singing a Song

It can be seen from Figure 7.2 that all of the results show a similar linear relationship. According to these scattergrams, high voice scores tend to be associated with high gesture scores. Although the correlation is not perfect, trends are observed. Table 7.4

Table 7.4   Pearson Correlations Between Voice and Gesture in Song Singing

	Pearson Correlation	Sig.	N
Body Efficiency	0.702	0.000***	36
Mastery of Gesture Technique	0.755	0.000***	36
Coordination of Voice and Gesture	0.842	0.000***	36
Gesture Quality (Overall)	0.790	0.000***	36

*$p<.05$; **$p<.01$; ***$p<.001$

presents the Pearson correlations between Voice and Gesture in song singing. The results revealed that the correlations between Voice and Body Efficiency ($r=$ +0.702, p< 0.001), Mastery of Gesture Technique ($r=$ +0.755, $p<$ 0.001), Coordination of Voice and Gesture ($r=$ +0.842, $p<$ 0.001), and Overall ($r=$ +0.790, $p<$ 0.001) showed a very strong positive association between Voice and Gesture. A correlation coefficient of the Coordination of Voice and Gesture ($r=$+0.842) was significantly stronger than that of Body Efficiency ($r=$+0.702) at the traditional 0.05 level in 36 cases. The possible reason for this could be because raters focused on the blending of gesture and voice; as a result, the correlation is much stronger. Compared to the correlations of Vocal Patterns, the children's association of Voice and Gesture in Song singing seems stronger than Vocal Pattern performance. The song is much longer than the vocal pattern, so it might permit more time for raters to give a more reliable score. In addition, the raters were only asked to give an overall score for Gesture Quality on vocal patterns, which might not be as accurate as simply focusing on the Coordination of Voice and Gesture. The correlations of Voice and Gesture in Vocal Patterns used the pretest score, whereas those in song singing used the posttest score. Training effect might be an important factor affecting this relationship.

Similar to Vocal Pattern, the correlations for girls were stronger than those for boys (see Table 7.5). However, the correlation between Voice and Coordination of Voice and Gesture was still stronger for both girls and boys. Hence, a focus on the assessment of Voice and Coordination of Voice and Gesture might be a better way to find the relationships.

Table 7.5   Pearson Correlations Between Voice and Gesture for Girls and Boys

	Girls			**Boys**		
	Pearson Correlation	Sig.	N	Pearson Correlation	Sig.	N
Body Efficiency	0.702	0.000***	23	0.422	0.151	13
Mastery of Gesture Technique	0.740	0.000***	23	0.538	0.058	13
Coordination of Voice and Gesture	0.820	0.000***	23	0.793	0.001**	13
Gesture Quality (Overall)	0.776	0.000***	23	0.638	0.019*	13

*p<.05;**p<.01; ***p<.001

7.2   How Gesture May Help the Voice

A clear relationship between voice and gesture was found in the above. Does gesture help voice all the time or are any specific conditions required? The scores of voice With [V(g)] and Without Gesture [V] were used for the analysis in this session. The following section will discuss how gesture helps voice in improving intonation and tone quality for individual singing. Because only Groups 2 and 3 used gesture during choral rehearsals, the data analysis is based on the scores of Groups 2 and 3.

Vocal Pattern

Intonation

Table 7.6 illustrates the means and standard deviations for intonation scores with

gesture use and without gesture. Generally speaking, it can be seen that the majority of

vocal patterns gained a higher score on With Gesture than Without Gesture [V(g)>V]. In

other words, it can be observed that children who used gesture did not always get a

higher score than singing without gesture. According to the supplementary

questionnaire, 2.9% of the children stated "gesture *always* help me in singing"; 28.6%

of them stated "gesture help me in singing *most of the time*"; 22.9% of them stated

"gesture *sometimes* help me in singing"; 22.9% of them stated that there was "*not much*

difference with or without gesture in singing"; and yet 2.9% of them stated "gesture

does*n't* help me *at all*". Therefore, this seems to imply that gesture, though mainly

positive, may not always help in singing.

Table 7.6   Means and Standard Deviations for Individual Intonation Score by With
and Without Gesture in the Pretest and Posttest for VPs

	Pretest				Posttest			
	Without Gesture		With Gesture		Without Gesture		With Gesture	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
VP1	4.22	1.51	3.84	1.39	5.06	1.44	5.07	1.68
VP2	3.99	1.21	4.01	1.49	5.00	1.18	4.88	1.26
VP3	3.37	1.40	4.02	1.63	5.32	1.26	5.81	1.28
VP4	3.89	1.45	4.37	1.44	5.36	1.11	5.51	1.05
VP5	2.90	1.38	3.49	1.57	4.47	1.60	4.98	1.63
Overall	**3.67**	1.05	**3.95**	1.18	**5.04**	0.83	**5.25**	0.96

According to Figure 7.3, the differences between With and Without gesture were greater

in the pretest. It can be observed that the gesture for VP1 regressed [V>V(g)] and not

much difference was found in VP2. While there were significant differences on VP3 [t

$_{(35)}$= 2.742, *p*= .01], VP4 [$t_{(35)}$= 2.057, *p*<.05], VP5 [$t_{(35)}$= 3.532, *p*= .001] and Overall

[$t_{(35)}$= 2.526, *p*<.05] by using paired t-tests [V(g)>V]. Therefore, perhaps gesture helps

singers to overcome the difficult vocal patterns rather than the easier ones. This is also

obviously linked to previous analysis on gesture and movement training effect and
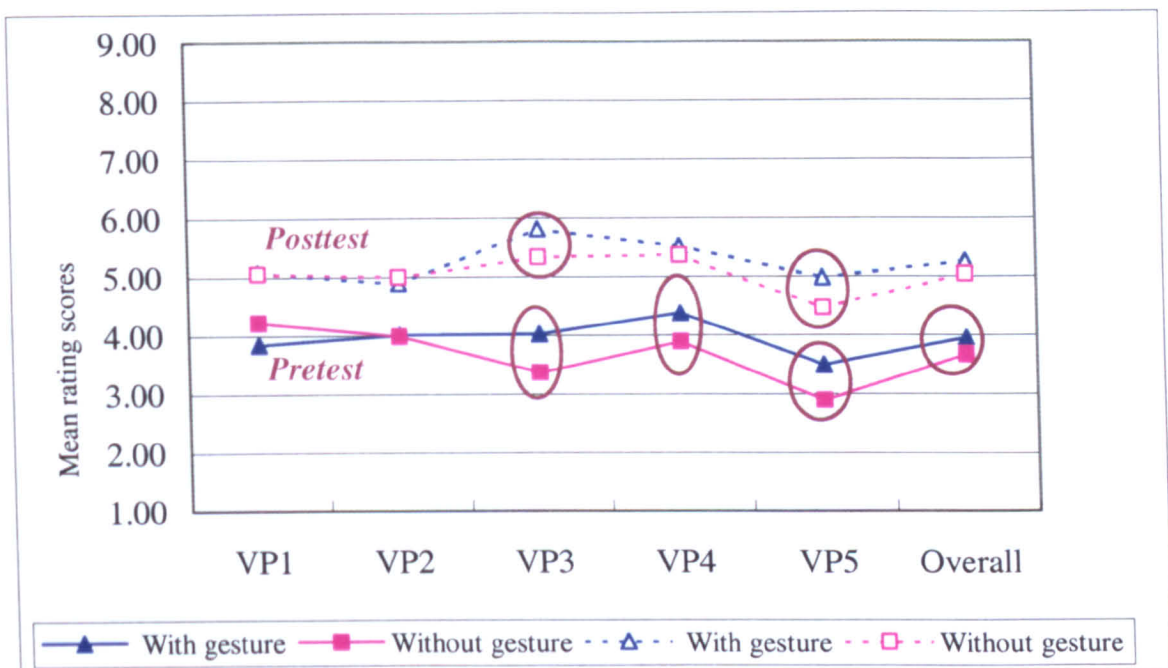
Note: circle highlights significance in paired t-tests

Figure 7.3   With and Without Gesture in each Vocal Pattern for Individual
Intonation Performance in the Pretest and Posttest

correlations (Chapters 6 and 7). Compared to the pretest, the posttest showed little

difference for each vocal pattern. It can be observed that the scores With and Without

Gesture were almost the same in the posttest. However, paired t-tests only showed the

significant differences in VP3 [$t_{(35)}$ = 3.072, $p<.01$] and VP5 [$t_{(35)}$ = 2.881 , $p<.01$].

Again, gesture still has a powerful effect helping difficult vocal patterns after the singers

had received some movement or/and gesture training. According to the questionnaire,

80% of children said they sang more accurately when using gesture. Therefore, gesture

had a positive effect in improving intonation.

A further repeated-measures ANOVA was carried out on the data in order to collect

more information about the two groups (Groups 2 and 3) and some interactions. For

intonation performance was analysed with one between-subjects factor (Groups 2 and 3)

and two within-subjects factors of Training Time (pretest vs. posttest) and Gesture Use

(with vs. without gesture). This analysis revealed that the main effect of Training Time

was significant in every vocal pattern which indicated that the scores increased with training (see Table 7.7). Main effect of Gesture Use was also found for VP3 [$F_{(1,34)}=$ 15.921, $p<.001$], VP4 [$F_{(1, 34)}$ = 4.310, $p<.05$], VP5 [$F_{(1, 34)}$ = 30.120, $p<.001$] and Overall [$F_{(1,34)}$= 9.498, $p<.01$]. This suggests scores increased when gesture was used, as compared with no gesture use, as discussed on page 160-161. Finally, the interaction between Group and Training Time was found to be increasing for VP2 [$F_{(1,34)}$= 6.480, $p<.05$] and Overall [$F_{(1, 34)}$ = 4.556, $p<.01$]. Figure 7.4 and 7.5 illustrate these interactions. It can be observed that a more marked effect occurred in overall scores when children received gesture and movement training (Group 3) as opposed to only gesture training only (Group 2) both in VP2 and Overall.
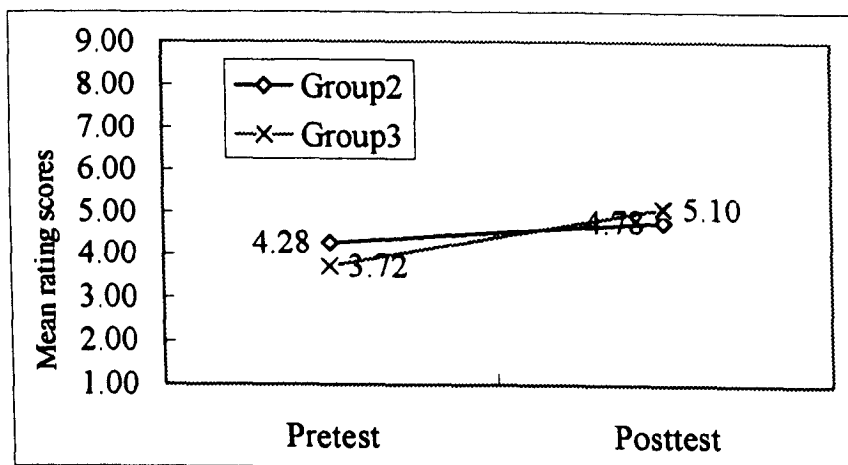
Figure 7.4 Interaction of Groups*Time in VP2 for Intonation
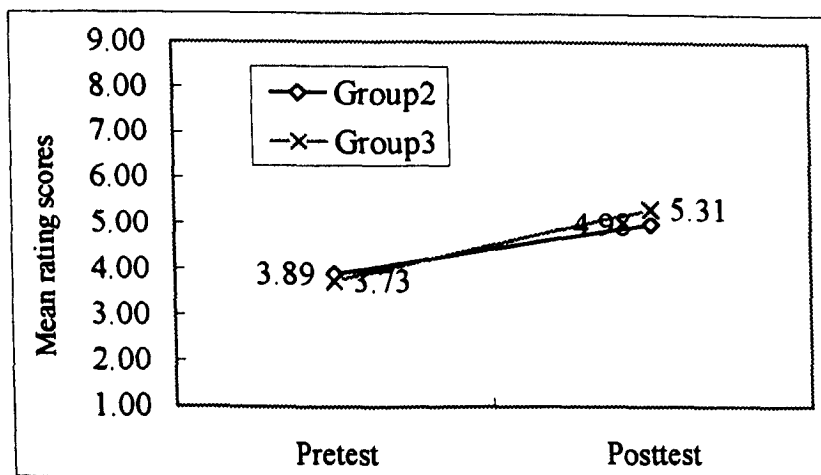
Figure 7.5 Interaction of Groups*Time in Overall for Intonation

Table 7.7 Summaries of Repeated-Measures ANOVA for Individual Intonation in VPs

	Sources	Sum of Squares	df	Mean Square	F	Sig.
VP1	Group	0.223	1	0.223	0.040	0.843
	Time	38.340	1	38.340	25.588	0.000***
	Group*Time	1.702	1	1.702	1.136	0.294
	Gesture	1.172	1	1.172	1.139	0.293
	Gesture*Group	0.063	1	0.063	0.061	0.807
	Time*Gesture	1.433	1	1.433	1.251	0.271
	Group*Time*Gesture	0.001	1	0.001	0.001	0.980
VP2	Group	0.483	1	0.483	0.121	0.730
	Time	31.813	1	31.813	29.574	0.000***
	Group*Time	6.971	1	6.971	6.480	0.016*
	Gesture	0.093	1	0.093	0.096	0.758
	Gesture*Group	0.562	1	0.562	0.584	0.450
	Time*Gesture	0.175	1	0.175	0.298	0.589
	Group*Time*Gesture	0.175	1	0.175	0.298	0.589
VP3	Group	7.403	1	7.403	1.765	0.193
	Time	125.907	1	125.907	60.346	0.000***
	Group*Time	2.600	1	2.600	1.246	0.272
	Gesture	11.475	1	11.475	15.921	0.000***
	Gesture*Group	1.495	1	1.495	2.073	0.159
	Time*Gesture	0.248	1	0.248	0.343	0.562
	Group*Time*Gesture	0.108	1	0.108	0.150	0.701
VP4	Group	0.306	1	0.306	0.089	0.767
	Time	61.387	1	61.387	37.262	0.000***
	Group*Time	3.560	1	3.560	2.161	0.151
	Gesture	3.574	1	3.574	4.310	0.046*
	Gesture*Group	0.003	1	0.003	0.003	0.954
	Time*Gesture	1.003	1	1.003	1.480	0.232
	Group*Time*Gesture	0.150	1	0.150	0.221	0.642
VP5	Group	0.561	1	0.561	0.078	0.781
	Time	84.512	1	84.512	53.674	0.000***
	Group*Time	0.001	1	0.001	0.001	0.982
	Gesture	10.929	1	10.929	30.120	0.000***
	Gesture*Group	0.062	1	0.062	0.171	0.682
	Time*Gesture	0.062	1	0.062	0.084	0.774
	Group*Time*Gesture	0.001	1	0.001	0.001	0.975
Overall	Group	0.290	1	0.290	0.089	0.767
	Time	64.258	1	64.258	133.204	0.000***
	Group*Time	2.198	1	2.198	4.556	0.040*
	Gesture	2.072	1	2.072	9.498	0.004**
	Gesture*Group	0.011	1	0.011	0.051	0.823
	Time*Gesture	0.038	1	0.038	0.198	0.659
	Group*Time*Gesture	0.057	1	0.057	0.299	0.588

*$p<.05$; **$p<.01$; ***$p<.001$

Table 7.8   Means and Standard Deviations for Individual Tone Quality Score With and Without Gesture in the Pretest and Posttest for VPs

	Pretest				Posttest			
	Without gesture		With gesture		Without gesture		With gesture	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
VP1	4.56	1.32	4.20	1.22	5.13	1.53	5.06	1.59
VP2	3.96	1.11	4.00	1.29	4.86	1.13	4.54	1.22
VP3	3.26	1.38	4.01	1.47	5.32	1.50	5.65	1.41
VP4	4.06	1.20	4.42	1.20	5.32	1.25	5.47	1.26
VP5	3.12	1.23	3.99	1.36	4.99	1.38	5.03	1.44
Overall	**3.79**	0.94	**4.12**	0.98	**5.12**	0.96	**5.15**	0.99

Tone Quality

Table 7.8 shows the means and standard deviations for tone quality scores with gesture use and without gesture. It can be seen that the majority of vocal patterns gained a higher score on With gesture than Without gesture [V(g)>V] in the pretest except VP1. In contrast, using gesture scored almost the same as without gesture in the posttest. Therefore, this could suggest that using gesture can help children to get a better tone quality in the pretest, but there is no clear evidence of this for the posttest. According to the supplementary questionnaire, almost all of the children (94.3%) reported that gesture helps them to focus on the tone, as a result, then producing a better sound. One of the students said that "*I feel my voice is brighter, more vital and louder when I use gesture*". Thus gesture use plays an important role in shaping a good tone.

As shown in Figure 7.6, similar to intonation, the differences between With and Without gesture were more significant in the pretest. It can be observed that the gesture for VP1 regressed and not much difference was found in VP2. Although children performed better when using gesture in VP4, no significant difference was found. However, paired t-tests showed that there were significant differences on VP3 [$t_{(35)}$ = 3.774, p= .001], VP5 [$t_{(35)}$ = 4.390, p< .001] and Overall [$t_{(35)}$ = 3.285, p<.01]. Therefore, again,

perhaps gesture helps singers to overcome the difficult vocal patterns for tone quality rather than the easier ones before training. Up to this point, these results are consistent with those on gesture and movement training effects and the correlations. Obviously, it can be observed that the scores With or Without Gesture are almost the same after receiving some gesture and movement training. As a result, no significant difference was found to exist between With or Without Gesture in the posttest. Thus, it may be inferred that perhaps the children had internalised all the gestures. Therefore, they performed as well even though gestures were not used.
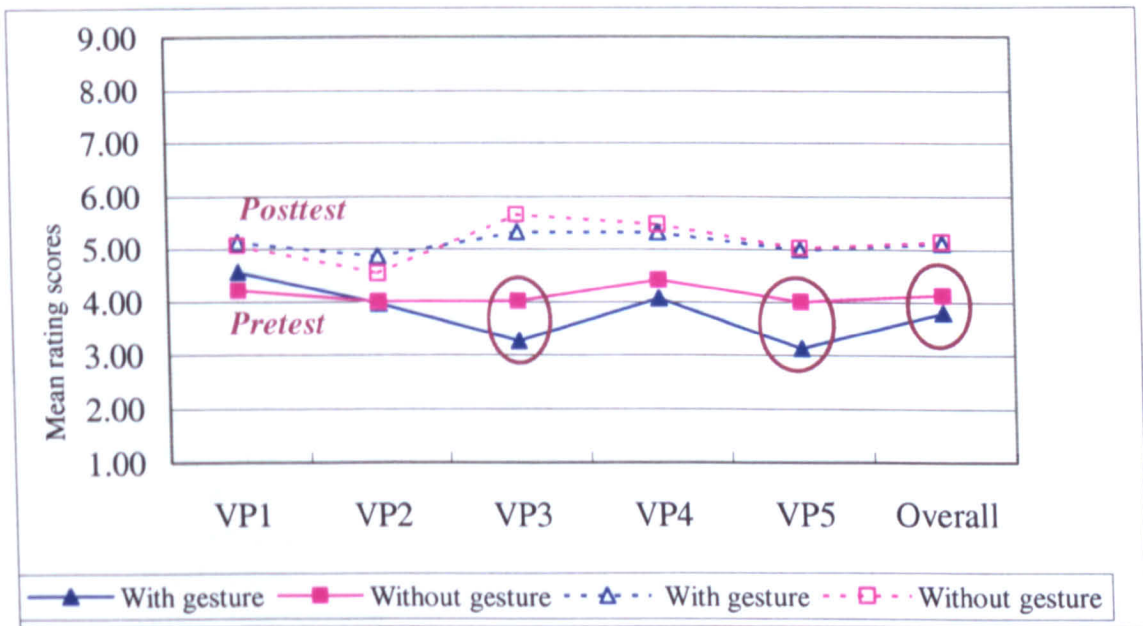
Note: circle highlights significance in paired t-tests

Figure 7.6 With and Without Gesture in each Vocal Pattern for Individual Tone Quality Performance in the Pretest and Posttest for VPs

A repeated-measures ANOVA was carried out. Similar to intonation, this analysis revealed that the main effect of Training Time was significant in every Vocal Pattern. This indicated that the scores increased with training (see Table 7.9). The main effect of Gesture Use was also found for VP3 [$F_{(1, 34)} = 3.774$, $p=.001$], VP5 [$F_{(1, 34)} = 4.390$, $p<.001$] and Overall [$F_{(1, 34)} = 3.285$, $p<.01$]. This suggests that gesture use scored higher compared with no gesture use. In other words, the gestures indeed had a

Table 7.9 Summaries of Repeated-Measures ANOVA for Individual Tone Quality in VPs

	Sources	Sum of Squares	df	Mean Square	F	Sig.
VP1	Group	0.308	1	0.308	0.056	0.814
	Time	18.304	1	18.304	15.254	0.000***
	Group*Time	2.976	1	2.976	2.480	0.125
	Gesture	1.628	1	1.628	2.460	0.126
	Gesture*Group	0.003	1	0.003	0.005	0.947
	Time*Gesture	0.789	1	0.789	0.929	0.342
	Group*Time*Gesture	0.312	1	0.312	0.367	0.549
VP2	Group	0.038	1	0.038	0.012	0.914
	Time	18.521	1	18.521	19.175	0.000***
	Group*Time	6.383	1	6.383	6.608	0.015*
	Gesture	0.739	1	0.739	0.938	0.340
	Gesture*Group	0.222	1	0.222	0.281	0.599
	Time*Gesture	1.169	1	1.169	1.787	0.190
	Group*Time*Gesture	0.007	1	0.007	0.010	0.920
VP3	Group	6.667	1	6.667	1.301	0.262
	Time	122.916	1	122.916	72.247	0.000***
	Group*Time	6.384	1	6.384	3.752	0.061
	Gesture	10.577	1	10.577	28.692	0.000***
	Gesture*Group	1.855	1	1.855	5.033	0.031*
	Time*Gesture	1.571	1	1.571	1.686	0.203
	Group*Time*Gesture	0.001	1	0.001	0.001	0.978
VP4	Group	0.841	1	0.841	0.250	0.620
	Time	48.604	1	48.604	45.109	0.000***
	Group*Time	4.333	1	4.333	4.022	0.053
	Gesture	2.336	1	2.336	2.393	0.131
	Gesture*Group	0.278	1	0.278	0.285	0.597
	Time*Gesture	0.407	1	0.407	0.651	0.426
	Group*Time*Gesture	0.007	1	0.007	0.011	0.918
VP5	Group	4.001	1	4.001	0.778	0.384
	Time	76.043	1	76.043	68.510	0.000***
	Group*Time	4.465	1	4.465	4.023	0.053
	Gesture	7.388	1	7.388	13.835	0.001***
	Gesture*Group	0.049	1	0.049	0.092	0.763
	Time*Gesture	6.240	1	6.240	12.205	0.001***
	Group*Time*Gesture	0.000	1	0.000	0.000	0.998
Overall	Group	1.563	1	1.563	0.517	0.477
	Time	50.015	1	50.015	143.749	0.000***
	Group*Time	4.816	1	4.816	13.842	0.001***
	Gesture	1.150	1	1.150	7.076	0.012*
	Gesture*Group	0.255	1	0.255	1.571	0.219
	Time*Gesture	0.840	1	0.840	6.838	0.013*
	Group*Time*Gesture	0.023	1	0.023	0.183	0.671

*$p<.05$; **$p<.01$; ***$p<.001$

powerful effect in overcoming the difficult vocal patterns (VP3 and VP5) in tone quality. Generally speaking, for tone quality, children performed better by using gesture while singing vocal patterns (significant in Overall). Several interactions were found. Firstly, the interaction between Group and Training Time was found to be rising for VP2 [$F_{(1,34)}$ = 6.608, $p<.05$] and Overall [$F_{(1,34)}$ = 13.842, $p=.001$] across the training period. It can be seen that a more marked effect occurred in overall scores when children received gesture and movement training (Group 3) as opposed to only gesture training (Group 2) both in VP2 and Overall (see Figure 7.7 & 7.8).
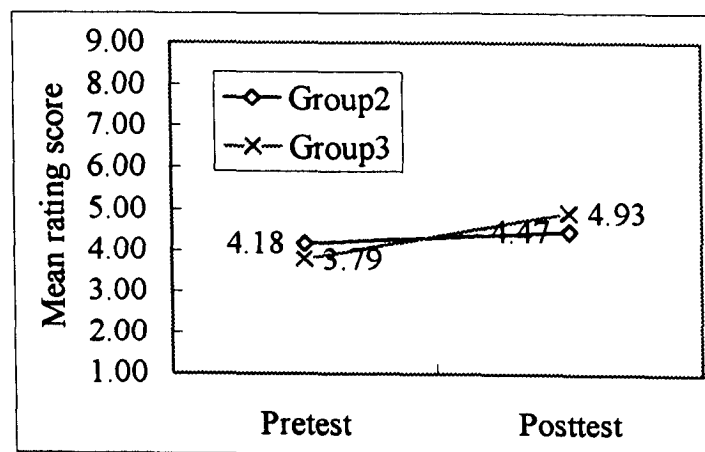
Figure 7.7 Interaction of Group*Time in VP2 for Tone Quality
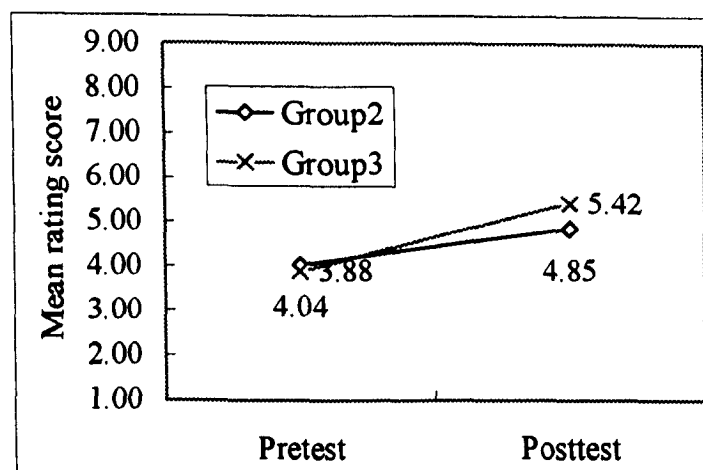
Figure 7.8 Interaction of Group*Time in Overall for Tone Quality
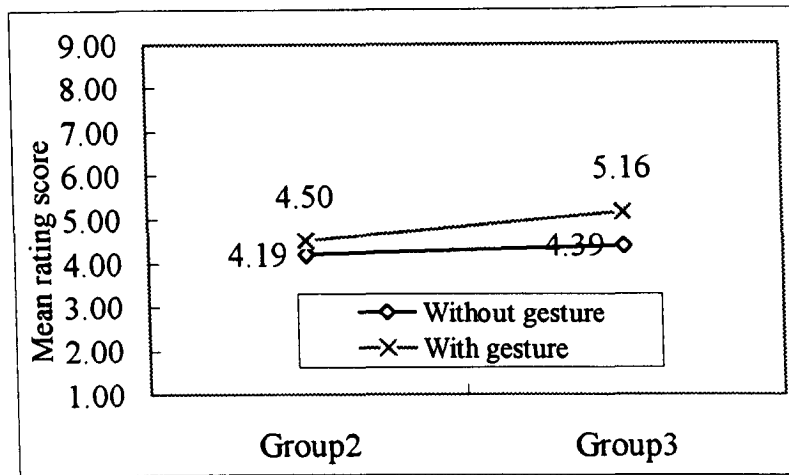
Figure 7.9 Interaction of Gesture*Group in VP3 for Tone Quality

Secondly, the interaction between Gesture Use and Group was also found in VP3 [$F_{(1,34)}$ = 5.033, $p<.05$]. According to Figure 7.9, it can be observed that scores changed in gesture only in Group 3. Finally, the interaction between Training Time and Gesture Use was found in VP5 [$F_{(1,34)}$= 5.033, $p=.001$] and Overall [$F_{(1,34)}$= 6.838, $p<.05$]. It can be observed from Figure 7.10 and 7.11 that tone quality scores when using gesture decreased slightly in the posttest compared with those when not using gesture.
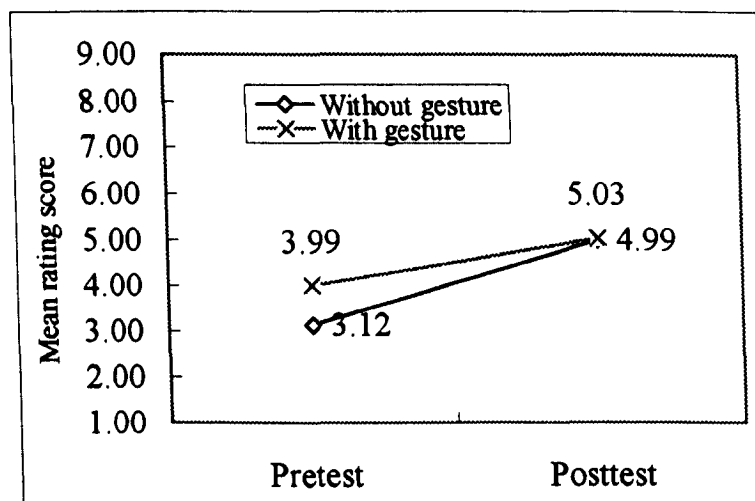
Figure 7.10 Interaction of Gesture*Time in VP5 for Tone Quality
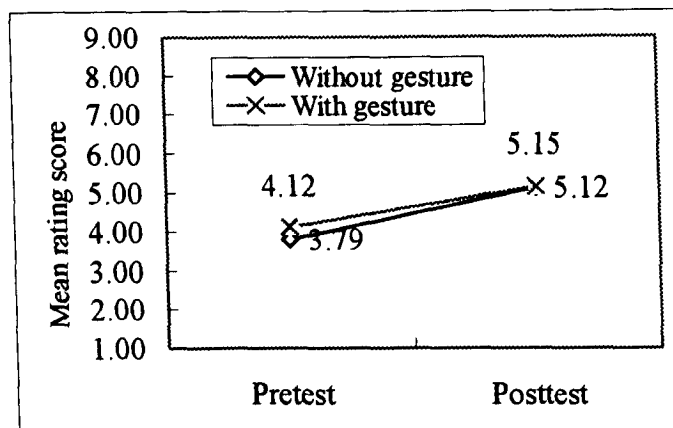
Figure 7.11 Interaction of Gesture*Time in Overall for Tone Quality

Comparison of Intonation and Tone Quality in Gesture Use

Although the effect of gesture use was not always significant in every vocal pattern and testing time, it showed a very positive effect in improving intonation and tone quality. However, the above findings lead to the following conclusions:

1. The effect of gesture in helping singing was more successful in the pretest, but made little difference in the posttest both for Intonation and Tone Quality.

2. VP3, VP5 and Overall With Gesture scored higher than Without Gesture in the pretest both for intonation and tone quality.

3. The gestures for VP3 and VP5 were still powerful in aiding intonation in the posttest.

Comparison of Boys and Girls in Gesture Use

As discussed above, gender may be a very important factor affecting the association between voice and gesture. Thus, it is vital to discuss the difference in gesture use for boys and girls.

Figure 7.12 presents the gesture use in intonation for boys and girls. It showed no difference between With or Without Gesture in the pretest for boys except VP5. Boys
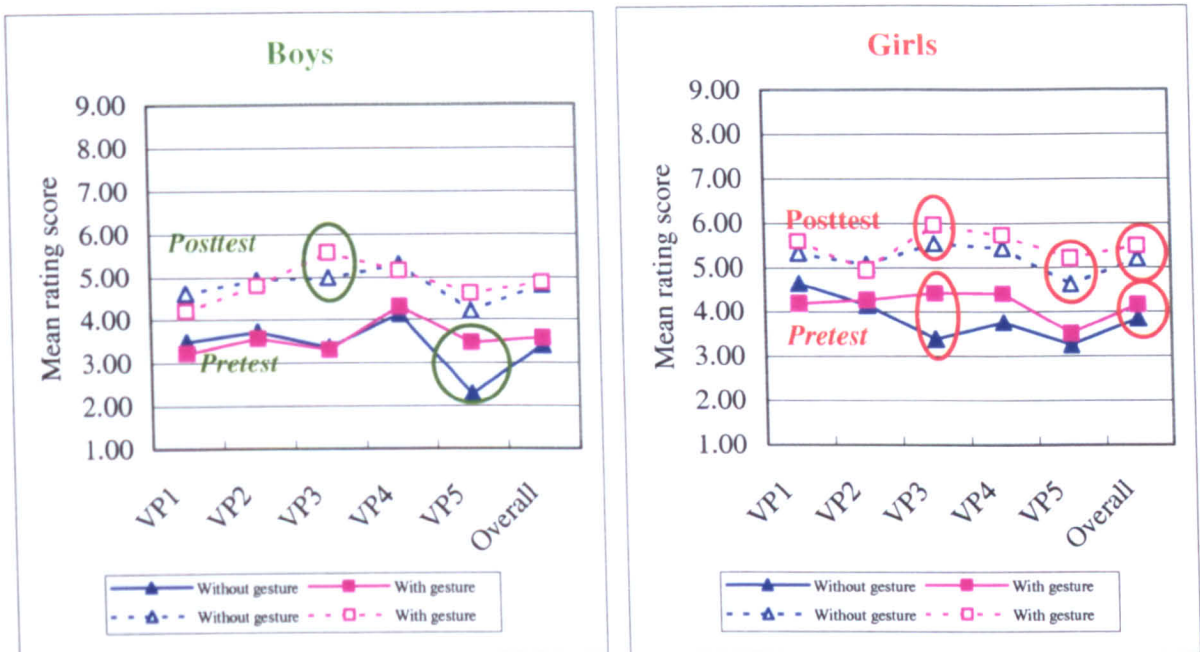
Figure 7.12   Comparison of Boys and Girls in Intonation With and Without Gesture in
Each Vocal Pattern

scored significantly higher With Gesture [t $_{(12)}$= 4.681, p=.001] in VP5. All of the vocal

patterns showed a higher score With Gesture in the pretest except VP1. There were

completely different results for girls: the difference between With and Without Gesture

was significant in VP3 [t $_{(22)}$= 3.380, p<.01] and Overall [t $_{(22)}$= 2.212, p<.05]. It is

clear that the gesture of VP5 helped boys in overcoming intonation problems, but this

was not significant for girls; whereas the gesture of VP3 helped girls to improve

intonation, but this was not significant for boys. From this point of view, it may be

inferred that the effect of gesture on VP5 was greater for beginner boy singers, whereas

for VP3 it was greater for beginner girl singers for improving intonation.

The graph also demonstrates that the gesture of VP3 [t $_{(12)}$= 2.279, p<.05] had a positive

effect in improving boys' intonation after some gesture or/and movement training. This

significant difference is likely to be due to boys having learnt how to use gesture, and as

a result, they sang more accurately by using gesture in VP3. However, no other

significant differences were found for boys in the posttest. Comparing girls with boys,

the significance of VP5 [t $_{(22)}$= 2.330, p<.05] was found only after training for girls but did not appear before training for boys. This may imply that it is easier for boys than girls to apply the gesture techniques to help voice before training. However, similar to the pretest, the differences between With and Without gesture in VP3 [t $_{(22)}$= 2.100, p<.05], VP5 [t $_{(22)}$= 2.330, p<.05] and Overall [t $_{(22)}$= 2.173, p<.05] were still significant for girls in the posttest.
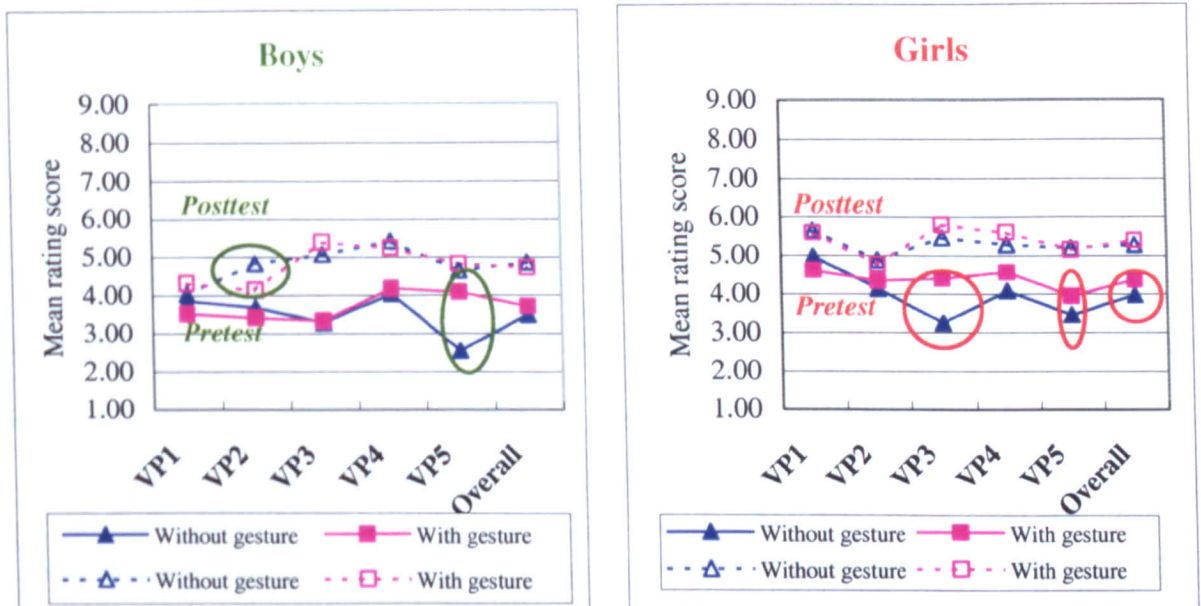
Figure 7.13 Comparison of Boys and Girls in Tone Quality With and Without Gesture in Each Vocal Pattern

Figure 7.13 shows the comparison of boys and girls in tone quality With and Without gesture in each vocal pattern. These were exactly the same as intonation for boys: the significant positive effect of gesture in improving tone quality was only found in VP5 [t $_{(12)}$= 4.106, p= .001] in the pretest. Boys scored higher with gesture in VP5. Paired t-tests revealed a significant difference between With and Without Gesture in VP3 [t $_{(22)}$= 4.510, p<.001], VP5 [t $_{(22)}$= 2.575, p<.05] and Overall [t $_{(22)}$= 2.770, p<.05] for girls' tone quality in the pretest. Unlike intonation in the posttest, boys regressed by using gesture in VP2 [t $_{(12)}$= 2.360, p<.05]. However, the analysis only showed a

borderline significance. Therefore, no difference between boys and girls in the posttest for tone quality performance could be found except VP2. In short, gesture use showed a more positive effect for girls than for boys regardless of intonation or tone quality.

Individual: Song

Initially, children may find it very hard to sing a song with gestures. Therefore, in order to overcome unfamiliarity with the complexity of gestures, the children's song singing with gesture was only posttested.

Intonation

As shown in Figure 7.14, the children performed equally well, regardless of whether they used gesture (M=5.09, SD=1.76) or did not use gesture (M=5.09, SD=1.58) in Group 2. In contrast, the children performed slightly better when they used gesture (M=5.70, SD=1.24) than when they did not use gesture (M=5.51, SD=1.38) in Group 3. It can be seen that Group 3 scored higher than Group 2 regardless of whether they sang a song With or Without Gesture. The paired t-tests revealed no significant difference With and Without Gesture for Group 2 [$t_{(17)}= 0.003$, $p=.997$] and Group 3 [$t_{(17)}= 1.068$, $p=.301$].
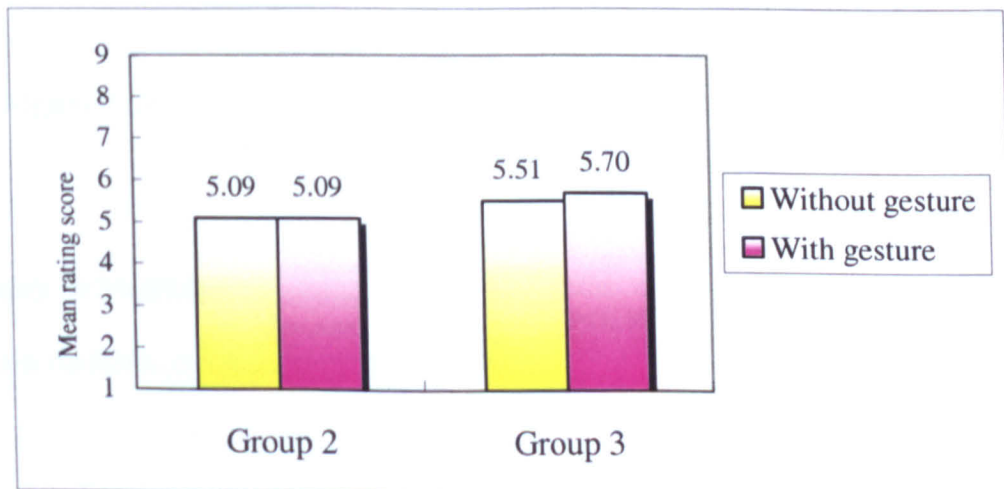
Figure 7.14   Comparison of Group 2 and Group 3 of Song Singing Intonation Scores With and Without Gesture in the Posttest

Tone Quality

According to Figure 7.15, similar to Intonation, the children performed equally well, regardless of whether they used gesture (M=4.88, SD=2.03) or did not use gesture (M=4.93, SD=1.54) in Group 2. In contrast, the children used gesture (M=6.00, SD=1.56) scored higher than when they did not use gesture (M=5.31, SD=1.09) in Group 3. Again, it can be seen that Group 3 scored higher than Group 2 regardless of whether they sang a song With or Without Gesture. The paired t-tests revealed no significant difference With and Without Gesture for Group 2 [$t_{(17)}$= 0.102, p=.920] and Group 3 [$t_{(17)}$= 2.071, p= .054]. Although no significant difference was found in Group 3, the trend was for the use of gesture to improve performance.
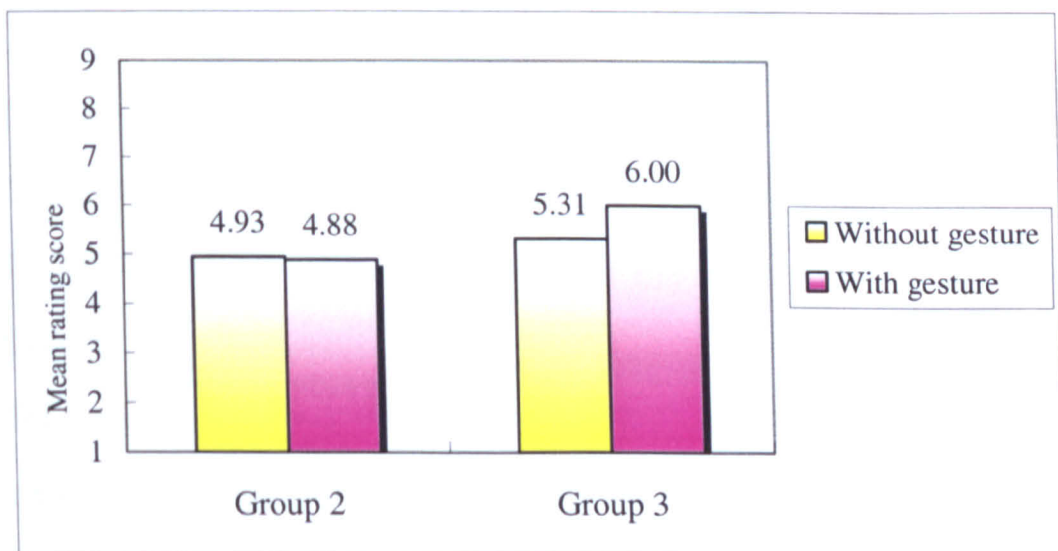
Figure 7.15   Comparison of Group 2 and Group 3 of Song Singing Tone
Quality Scores With and Without Gesture in the Posttest

Summary of Findings

The main findings can be summarised as follows:

The relationship between voice and gesture

1.   Pearson correlations showed that relationship between Voice and Gesture in vocal

pattern in VP1, VP2 and VP4 showed weak non-significant positive associations; whereas there was a moderate and significantly positive association between Voice and Gesture in VP5; and there was a strong significant positive relationship between Voice and Gesture in VP3 and Overall.

2. Pearson correlations revealed that relationship between Voice and Body Efficiency, Mastery of Gesture Technique, Coordination of Voice and Gesture, and Overall (Gesture Quality) all showed a very strong significant positive association.

How gesture may help the voice

3. The children sang significantly better with gesture in the pretest on VP3, VP4, VP5 and Overall; whereas the children sang significantly better with gesture in the posttest on VP3 and VP5 for Intonation.

4. The children sang significantly better with gesture in the pretest on VP3, VP5 and Overall; whereas no significant was found in the posttest for Tone Quality.

5. The effect of Gesture Use for boys and girls differed both in Intonation and Tone Quality.

6. There was no significant difference for children's song singing With and Without using gesture in Groups 2 and 3 both for Intonation and Tone Quality.

7.3 Discussion of Findings

The results of this chapter have shown in detail that a relationship between Voice and Gesture does exist. Furthermore, gesture showed a positive effect in aiding children's singing. However, it did not always work successfully because many factors were evidently contributing to the production of an effective gesture.

The relationship between voice and gesture

Vocal Pattern

The findings are consistent with the earlier pilot study which indicated that there is a close relationship between children's voice and gesture performance. The findings additionally showed that the intensity (weak vs. strong) of correlation in five vocal patterns were different. In other words, some of them had stronger correlations than others. Several possible explanations exist for this unexpected outcome which seem to fall into three categories: gesture design, gesture use and testing factors. These are considered in detail below:

(1) Gesture design factor

The quality and appropriateness of gesture design may be an influencing factor. If a gesture is not well designed, the children's voices will not be affected appropriately. It can be inferred that VP3 and VP5 are more appropriate than the other three vocal patterns because they produce stronger correlations. This is supported by Hibbard (1994) who stresses the importance of an appropriate gesture for a specific purpose.

Additionally, if the gesture is too complicated that is comprising several motions, children will find it difficult to focus on blending the voice and the gesture. For example, VP1 consists of several circling motions and putting one arm forward which might have been too complicated for the children. In addition, this gesture needs more balance and coordination, so it might be more difficult for someone to undertake with no physical training or kinesthetic experience. Therefore, it can be seen that the correlation of VP1 and VP2 were weaker.

(2) Gesture use factor

In the pretest if the children are not familiar with the gesture or the vocal patterns, the results will be affected. According to Greenhead (2002), people need to know how to use gesture before becoming good users. Therefore, the gesture will become meaningful. This is also confirmed by Gordon (1997). Without intention, a gesture can be 'empty' containing 'nothing' positive for the performance. In this case, the children need to learn the gesture first. In addition, the ways children used gesture differed which might also have caused different types of result. For example, if a gesture was accompanying the voice, perhaps too much emphasis was placed on the voice and a careless movement was produced. According to my teaching notes and the supplementary questionnaire, although the teacher repeatedly guided the children to 'let the gesture lead your voice', some of them still did not follow the direction. Indeed, those whose gesture had a negative effect seemed due to a failure to link gesture and voice.

(3) Testing factors

The reliability of raters assessment would also be an influencing factor since the data analysis were drawn from them. As mentioned in Chapter 5, judging task overload diminished the rater's judgment consistency. However, all the raw data were randomly presented to different raters, which might have balanced out some of the bias. Furthermore, if a gesture contains many motion elements, some may be more or less obviously helpful to the children. The raters judged the overall composite movements which comprised each gesture, as a result, perhaps there were sub-component movements that were more or less successful. Finally, the tests used in this study might be not powerful enough or sufficiently appropriate to measure the association of Voice and Gesture. From this point of view, it may imply the importance of selecting a more powerful test instrument which could raise the same issues about the assessment validity,

but this point will be discussed more fully in the overall conclusions (see Chapter 8).

Alternatively, a better way might be to give a longer melody or song for the judgement

which will be discussed in the following paragraph.

Song Singing

Compared to Vocal Pattern, the association between Voice and Gesture in Song Singing

showed a higher consistency and a stronger correlation. The explanation for this might

be primarily due to assessment factors. The raters were asked to judge the gesture

quality on Vocal Patterns with a very short duration (2-7 seconds), whereas they were

asked to judge Song Singing with a longer duration (approximately 50 seconds). If the

task is longer, perhaps it allows more time for rating and thus the results may be more

reliable. In addition, it might have been better to ask the raters to only focus on rating

the coordination of voice and gesture in the Vocal Patterns. According to the results of

Song Singing, the correlation between Voice and the Coordination of Voice and Gesture

is the strongest. Therefore, if the raters had focused on the coordination of voice and

gesture in judging the vocal patterns instead of observing overall gesture quality, the

correlation for vocal patterns might have been stronger. The different results may infer

and support the assumption that training makes gesture more meaningful (this will be

discussed in more detail later); as a result, the relationship between voice and gesture is

stronger. These claims are, of course, made cautiously since there are several possible

interpretations.

The results indicated that the correlation between Voice and Coordination of Voice and

Gesture is higher than that between Voice and Body Efficiency or Mastery of Gesture

Quality. The possible reason for this is because video with sound was provided for

raters to judge Coordination of Voice and Gesture, whereas video with mute was

provided for other two. Therefore, the judgment of Coordination of Voice and Gesture may provide the raters with more information especially for the voice. Another possible reason for this, the most important one, is likely to be because the judges were focusing on the blending of voice and gesture on the Coordination of Voice and Gesture. Therefore, if the judges had focused only on the blending of voice and gesture, it might have been a more appropriate way to see the association. In short, we can conclude that the Coordination of Voice and Gesture as a gesture score is almost certainly a better way to rate the association between Voice and Gesture.

Although the positive correlation between voice and gesture was found in this chapter, the definition of voice is limited as it is the averaged scores for Intonation and Tone Quality score.

How gesture may help the voice

Vocal pattern

Children tended to sing better with gesture in this study. The effect of gesture use was better in the pretest than in the posttest both for intonation and tone quality. One possible reason why the use of gesture had less effect in the posttest is that the children may have internalised all the motor images; therefore, they performed equally well whether or not they used gesture. This is supported by Taylor (1989), Haasemann & Jordan (1991), Wis (1993), Hibbard (1994), Mead (1994), Gordon (1997), Greenhead (2000), and Chagnon (2001). This is also supported by the assumption of the current research model. However, gesture did not always have an immediate effect on in the pretest. The results showed that gesture had an immediate effect only for difficult vocal patterns (VP3 and VP5). We can definitely infer that the gestures for VP3 and VP5 had a powerful effect in improving intonation and tone quality and conclude that gesture is

helpful in overcoming difficult vocal patterns. However, it is possible that an overload or overuse of gesture could result in a counter-effect. This point is supported by McCoy (1986) who states that overuse of movement strategies results in perfunctory and ineffective movement. Similarly, Greenhead (2002) also indicates that if the gestures are overused or without any variation on them, the effectiveness of gestures will be reduced. In this study, the children were perhaps tested too many times on the same vocal patterns and gestures. Thus, boredom may have affected the outcome. But, some efforts were made to minimise these effects such as praising the children before the testing started.

It is clear that gesture does not 'always' have a positive effect in improving singing. Many possible reasons could contribute to this outcome. The prerequisite for the gesture being positive is that the gesture must be effective. It appears that there are some criteria for gestures to be effective.

1. **Appropriate gestures**

   The first and the most important one, is that the gesture should be appropriate to the specific vocal pattern. This has been discussed above.

2. **It needs some training**

   Greenhead (2002) has pointed out that before using the gesture, one has to learn how to use it. She also stresses that if the children just mirror the teacher's gestures without understanding or feeling it, their gesture has no intention which will easily cause a lack of attention and eventually result in an unsuccessful sound. Hibbard (1994) also maintained that one must know how to use the gesture. Sousa (1988) indicated that ensemble experience not only had a significant effect on a student's ability to recognise conducting gestures, but also it enhanced his understanding of conducting gestures. Similarly, Cofer (1995) also proposed that short-term

conducting gesture instruction is effective in improving the recognition and performance of musical conducting emblems. In this case, it may imply the necessity of training for understanding gestures and enhancing the sensations that can be achieved through them. Furthermore, it might also indicate that appropriate gesture techniques are required. This was discussed in Chapter 3.

3. **Practice could well make perfect**

As we observed from the pilot study, the children performed better once they had practised the gesture several times.

4. **Sufficient training**

Hibbard (1994) and Greenhead (2002) pointed out that it takes time to adjust to using gesture to coordinate voice and gesture. According to the Eurhythmics principle, Greenhead (2002) stated that it takes a longer time to train the muscles for the appropriate balance. If the techniques are matured, the children are able to make a more effective gesture.

5. **Variety of gestures**

If the children do the same gesture many times, the muscles may become tired and lose their function. In addition, they may feel bored and this boredom could stop them from concentrating, feeling, thinking and listening, and therefore the gesture may lose its efficiency. From this point of view, the teacher must therefore vary their approaches to keep the singers fresh and mentally alert.

6. **Teacher's direction**

A sixth possibility is that a teacher's direction also has a potential factor in influencing the gesture efficiency. Greenhead (2002) argued that a proper explanation is necessary but sometimes if the teachers give too many explanations it diminishes the effect of the gesture because the students have got too much information to concentrate on. Therefore, if teachers do not provide proper

direction, the gesture efficiency will be decreased.

7. Singing capacity

Vocal ability might be one of the possible factors to affect the effectiveness of gesture. As mentioned in Chapter 6, the use of gesture involves two different kinds of aspects—singing and motor. If their singing voice has not been well developed, it will be more difficult to focus on the blending of voice and gesture.

We may conclude that training made the gesture more effective. Clearly, the teacher plays a crucial role to guide the children towards better gesture use in singing.

Song Singing

Compared to vocal patterns, the gesture effect was less powerful in song singing. The results in the present study indicated that there was no significant difference in the children's performance whether or not they used gesture while singing a song for Intonation and Tone Quality. This absence of significant differences in With and Without Gesture use seems to be for a number of reasons. Firstly, gesture might take time to influence song production. As mentioned above, it needs time to train the children to be a good gesture user. Secondly, the songs are much longer and more complicated than the vocal patterns. Therefore, it takes longer time to internalise these sensations. Thirdly, too many gestures used in one song might decrease efficiency. In the song test, six different gestures were included which might have been too complicated for the children to manipulate. Fourthly, some of the gestures might be appropriate and some of them may not be appropriate to children. For example, the first gesture in the song (swinging in the space, see the gesture in VCD track D) may be too difficult for the children. Greenhead (2002) confirmed the efficiency of all the gestures used, but stated that the swinging gesture needed three dimensions of space for an effect.

Thus, it might have been too difficult for the children because they were unable to feel the space behind them. Therefore, it is very important to design appropriate repertoires of gesture for children. Finally, the children did not practice the gesture in song singing during the training because of the controlled condition. Thus, it may not have been easy for them to manipulate the gestures in singing.

Although no significant difference was found, the trends showed that the children who received gesture and movement training performed better while singing a song with gesture. According to Greenhead (2002), members of Group 3 who had more movement training were better able to use gesture because they had a generally better body awareness.

Gestures of vocal patterns

According to the findings in this study, the effect of gesture in difficult vocal patterns and correlation between Voice and Gesture differed. It was found that the more difficult the vocal pattern (VP3 and VP5), the more efficient the gestures. It also revealed that the more difficult vocal patterns (VP3 and VP5) had stronger correlations between Voice and Gesture than the easier ones. As mentioned in Chapter 5, one possible explanation for this result was that the more difficult tasks needed more concentration. Perhaps the children had to give more attention to the difficult vocal patterns both in testing and training, and as a result the gestures were more effective. In other words, gesture has a more positive effect in helping children to overcome the different vocal patterns.

Vocal Pattern 1 is the most controversial in this study when compared with the others. The results showed no significant difference between the three teaching methods on

VP1 in Chapter 5. In addition, they also indicated that gesture effect was not significant on VP1 both in pretest or posttest. Furthermore, the correlation between voice and gesture was also low and even negative for boys. In assessing these outcomes, it seems that VP1 is the easiest Vocal Pattern in this study, but the gesture is not easy. Children tended to associate the difficulty of Gesture with that of Voice. Vocal Pattern 1 was easy, so perhaps the children did the gesture with less concentration. As discussed previously, VP1 needs more coordination and balance. It is clear that this gesture might need some modification if it is to be integrated into a training programme.

Generally speaking, the gestures (VP3, VP4, VP5) with bending knees had a very good effect according to the results. This is confirmed by Apfelstadt (1985), Grant (1987) Greenhead (2000) indicating that slightly bending can lengthen the spine, and release the lower back and tension which will result in a better tone. Hemsley (1998:28) confirms this and states that "the feeling of a low center of gravity—of being grounded—will enable the singer to avoid tension and energy blockage in the midriff." 'Yawn-sigh' pedagogy has been regarded as a perfect singing technique. VP2 and VP3 begin with an open motion that encourages the lifting of the soft palate through yawning, therefore the effect was very positive. Fuelberth (2001) examined the effect of left hand conducting gesture on singer's vocal tension. She found that palm up caused vocal tension. Among the six gestures examined in the study, only palm down did not cause vocal tension. VP4 was designed for a palm down effect to push down for octave sliding which seemed to help the students to release the tension and lengthen their spines.

The type of melodic progression for VP5 is an ascending and descending broken minor chord. The normal problems of singing this VP5 for children include insufficient 'space' for the top notes, and so vocal and physical tension creep into the top notes. A 'circling'

gesture encourages 'space' for singing a high note and bending knees helps the singers to release the tension (Apfelstadt, 1985; Grant, 1987). Additionally, the minor chord needs a darker tone quality, a 'circling' gesture provides the sensation of a hollowness and roundedness which helps children to create a darker and more round sound (Greenhead, 2002). Findlay (1971) also feels that the natural tendency to rise and fall (like VP5), or expand and diminish, is part of the basic pattern of human tension and release. In this sense, the gesture for VP5 works seems to work very well. In sum, we might conclude that three (VP3, VP4, VP5) of the five designed gestures seemed to be successful tests, with two (VP1, VP2) needing further modification to fit with the training programme undertaken.

Gender difference in gesture use

McCoy (1986:58) pointed out that if the students are too inhibited about movement for their technique, the effect of movement is affected. The findings in this study indicated that boys' gesture performance was inferior to girls'. The results also showed that the association of voice and gesture for boys was weaker than that for girls. In addition, the effect of gesture, generally speaking, for boys was not as good as for girls. The reasons for these outcomes may include the students' attitude, the teacher's role, sex role stereotyping, media influence and physical differences between male and female. McCoy (1986) reported that the use of movement could positively influence the attitude of the singers toward participation in a choral ensemble. Boys and girls' attitude to gesture and movement could be an important factor in influencing the outcome. Previous studies have shown that girls' attitude to movement activities is more positive than boys, therefore, their performance is also better than boys. Conversely, Taylor (1989) has found inconsistent results in that fifth-grade girls tended to be embarrassed to begin but go on to admit to enjoying the movement activity; whereas the boys were

less inhibited and showed evident delight in being able to very much more physically active in movement activities. This discrepancy could be explained by the following reason.

Berryman *et al.* (1991) discuss that the importance of the teacher's role in children's school learning. Boys tend to approve of male behaviours, whereas girls tend to approve female behaviours. In addition, age is also important in the need for an approval role, with the period 11-12 years being the critical age. The lessons in this study were taught by a female teacher; therefore, boys may not have approved of the female teacher's behaviour. In addition, children have a very strong sex-role stereotyping towards music learning (Abeles & Porter, 1978; Delzell & Leppla, 1992). The boys may be against using gesture because they think it is 'a girl's thing'. In this sense, it may imply that the role of sex role model in the teaching of gesture and movement is a critical issue. Greenhead (2002) indicates that the teacher needs to show a neutral tone and provide neutral movement activities in a mixed gender class. She also suggests that it might be good to separate girls and boys at the beginning of movement training. The main reason is that if the numbers of boys are typically less than girls (as was the case in this study), and boys may feel self-conscious about using their bodies.

According to Berryman *et al.* (1991), models drawn from the mass media such as television programmes of films have a powerful influence on children. Taiwanese boys worship Chinese heroes who use the martial art 'Kung-Fu' and they like to imitate this role from the television films. The gestures of VP3 and VP5 are similar to the Chinese Kung-Fu poses. Therefore, the boys were not only more positive about them, but also obtained a higher achievement using them.

Boys love to show their 'power'. This was observed in classes where the boys tended to be more active in participating in some of the movement games when gross muscles were involved. They did not like describing the phrase by hand drawing. In this study, the gestures of VP1 and VP2 mainly used fingers. As a result, the boys appeared to have a more negative attitude and lower achievement perhaps because they felt the gestures were for girls. From this point of view, it will be a big challenge for the teachers to design the gestures for a mixed class.

CHAPTER 8

CONCLUSIONS

The aim of this chapter is to draw together the central concerns of this thesis, namely the effects of gesture and movement training on the intonation and tone quality of beginner children's choirs. First of all the findings of the previous empirical chapters will be summarised. Then important issues emerging from the results obtained will be discussed.

Summary of thesis

Gesture use for beginner children's choirs has not been studied extensively using quantitative studies. Therefore, the aim of Chapter 3 was to collect data about how children can work with voice and gesture. Pilot interviews and observations were carried out to provide a background for the development of a main quantitative study. The results demonstrated that there was indeed a close relationship between children's singing voice and their use of gesture. The children loved moving when they made sound, and performed better with movement or gesture. In addition, some gesture techniques were required for achieving a more effective gesture and a more successful sound. From these data, hypotheses were made about effective movements and gestures, therefore a series of training and test materials to examine Gesture and Movement training effects were subsequently developed for the main study. These are reported in Chapter 4.

Chapter 5, the main empirical study, compared three different training techniques on children's vocal intonation and tone quality. Through detailed quantitative analyses, the results provided more concrete support for the assumption that the children who have

received gesture and/or movement training will perform better than those who do not. Gesture was found to aid general kinesthetic sensation, but it was the combination of gesture and movement training that seemed to be the most powerful training technique. The effect on tone quality was found to be high, greater than the effect on intonation especially for group singing at an earlier training stage. This was argued to be the effect of movement training as it involves the whole body travelling through space using weight and energy, giving a means of bodily experience for the sounds desired.

The aim of Chapter 6 was to examine the effect of the movement training programme on improving gesture quality. The results indicated significant differences between those groups who received gesture only training (Group 2) and those who received movement and gesture (Group 3) in their scores for Body Efficiency, Mastery of Gesture Technique and Overall Gesture Quality.

The design of movement training in the current study was mainly based on Dalcroze Eurhythmics. Labuta and Smith (1997) state that one of the aims of Eurhythmics is to develop physical flexibility; therefore the students' bodies tend to have an easier and more accurate movement. This would suggest therefore that Dalcroze-based movement training enhanced the children's gesture quality. However, the analyses undertaken in Chapter 6 revealed that not all outcomes supported this trend. Coordination of Voice and Gesture showed non-significant differences. But, the technique of Coordination of Voice and Gesture demands two aspects of development: voice and motor skill. Therefore, the length of instruction undertaken in this study may have been insufficient to achieve statistical significance between the gesture only and movement and gesture training conditions which could account for this outlier result.

The final experimental chapter (Chapter 7) attempted to provide additional evidence to explain the relationship between voice and gesture. Generally speaking, these analyses showed that the children tended to sing better with gesture. This suggested that gesture provided a kinesthetic sense of motion which can be an effective tool in aiding singing. However, it was discovered that some specific requirements and techniques were necessary for gesture effects to be positive:

1. Before using the gesture, the singer needs to know how to use it so that the gesture has a clear intention.

2. In order to make a more effective gesture, gesture practice and relative training are necessary.

3. If the gesture was appropriately designed for particular sound and purposes, it can have a very positive effect.

4. A variety of gestures improve efficiency. Overload or overuse of gesture can result in a counter-effect.

This chapter therefore presented some results that could be of use to teachers or choral directors: namely, that they need to explore the singers' ability for physical development in order to design an appropriate repertoire of training gestures. In addition, it also emerged that it was important to consider the differences between girls and boys, with some differences in the fluency of movement being observed between the two groups. It was argued that might be useful for teachers to provide different gestures for a particular vocal pattern for boys and girls. Indeed, an emergent issue for music education was that it was necessary to provide the chance for the students to explore the gesture and the voices in their own ways. For example, how gesture changes their voices and how this can cause a negative as well as positive outcome. Thus, in discussion it becomes

apparent that the teacher needs to motivate and so explore the use of gestures with the children to find an appropriate testing method. Besides, the teacher must know how to modify the gestures and so lead the children to a correct and appropriate sound and image.

Implications of the Empirical Results

Theoretical implications

It is important to return to the theoretical framework established at the beginning of this thesis to assess the research undertaken (see the theoretical model for the research in Figure 4.1, p. 87). Generally speaking, the results showed a very strong and positive evidence to support the original model. However, in light of the current study, Figure 8.1 presents a revision (the red colours show the revision). According to the results, although the children practise the linking of voice and gesture in both Groups 2 and 3, the quality of their motor images in memory should be different due to the movement training effect of experiencing travelling through space. In Group 3, the children not only had the sensation of singing vocal patterns with specific gestures, but also had a better quality of whole body sensation such as an expressive element of flowing. Bearing this modification in mind, this thesis therefore presents an empirically tested model of gesture and movement work in choral singing.

Methodological implications

Overall, the current study has revealed that it is possible to train and test the efficiency of different choral singing methods. Perhaps the training and testing procedures needed more development, but as an introductory study, these data seem to show that both training and testing were possible and the effects of training were more or less positive. The findings showed a different intensity of inter-reliability with the different sets of
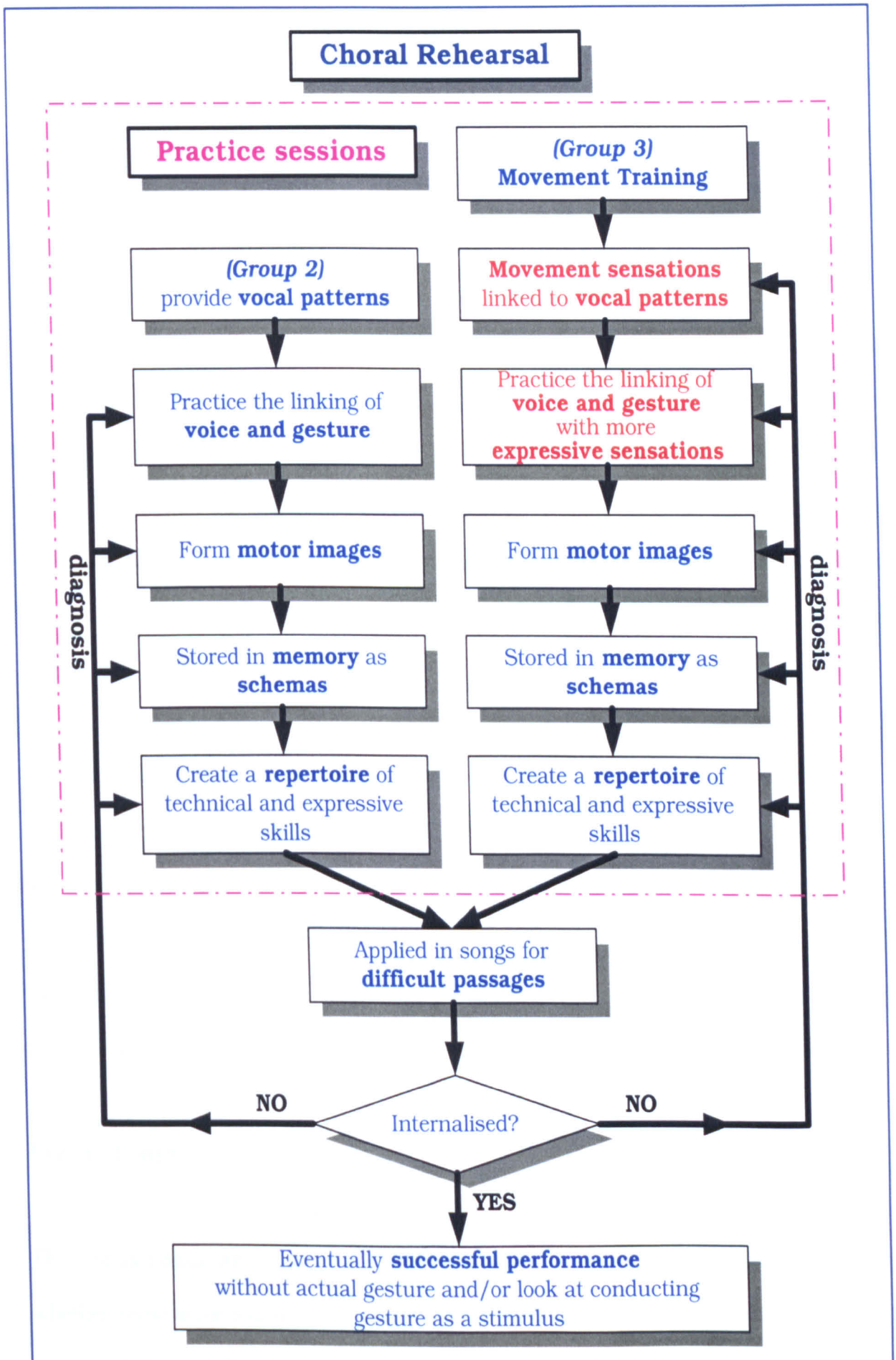
Figure 8.1 A Revised Model for Choral Training

judges. Generally speaking, it was found that if the task given to the judges was of shorter length or involved more assessment tasks (this is the case of vocal pattern in this study), this would cause a lower reliability which might also affect the results. It implies that the consideration of the judge's level of tiredness and boredom is essential for improving the assessment reliability and validity.

The children in this current study were selected from six existing classes. Because of the homogeneity of the groups, their group dynamics, attentiveness and culture seemed to influence the initial classes. That is, they were used to working in a particular manner together. Although the statistical analysis showed no difference between these three groups in their singing ability before training, their response to the class could have been different because of their particular class history (dependent on their teacher's use of discipline etc.). So, a totally random sample might have produced different results.

There are some limitations to the interpretation of the data. Some of the students had flu at the posttest because the posttest was conducted in the winter. This might affect the reliability. Furthermore, the culture of the school may also influence students' attitude to gesture and movement training. In addition, the sample size is smaller than a normal Taiwanese choir. Therefore, the resultant generalisations are limited to the particular group studied in this research.

Practical implications

Issues emerging from the findings

This thesis began with quite modest aims, essentially to test, in an objective manner, whether movement and gesture could facilitate the learning and vocal performance of young children. The results, though focusing specifically on vocalisation and

developing the voice, indicated quite powerfully that body movement could indeed improve the entire vocal process. In some ways this could have been a simple and single outcome. However, this study involved me as the author in a detailed investigation of specific gestures and movements in order to develop test stimuli all of which proved to be more or less effective.

The literature indicates that a clear and correct motor image of pitch can be crucial for aiding good singing especially for beginners. Indeed, it may be very difficult to explain the complicated vocal process and vocal mechanisms to children, thus non-verbal techniques can potentially provide direct means for working with voice production. The results of this current investigation provide the most comprehensive evidence to date for the use of gestures in improving intonation and tone quality. Looking back over the process of gesture design and work with the children, it is evident that not only does the teacher need to possess the knowledge and experience of singing and movement, but also needs to have good directing skills. Only through effective presentation will the gestures be meaningful and have a positive effect on improving vocal skills.

Based on the results of this study, several conclusions about using gesture as a training tool in choral settings are drawn:

1. A teacher's verbal direction and demonstration of the gesture should be clear and accurate. In particular, some gestures may need a different position (facing the children or standing at a different angle). For example, a good way to demonstrate circling is a 45° turn, even with the teacher's back to the children, otherwise it is easy for the children to produce a counter-clockwise circling and cause an entirely different effect.

2. Proper feedback is necessary. In particular, verbal imagery is helpful to confirm their gesture correction especially for the children who have less singing experience.

3. Proper modification of the singer's gesture is necessary to obtain optimal vocal effects. One of the advantages of using gesture is that it provides visual assessment for the teachers to quickly pick up which students have not understood the sensation or how much they have done in order to produce the correct sound.

4. Some techniques are necessary for an effective gesture. For example, a correct gestural direction, size, position and time-space.

5. The teacher's attitude and tone when expressing the gesture should neither emphasise the teacher's own vocal range or his/her sexuality in any explicit manner in a mixed gender classroom. This is to minimumise the impact any provocative behaviours might have on the children's understanding of and desire to participate in the work. For example, if the teacher's tone is too soft or too high when describing the gestures, the boys might not feel comfortable following this.

Previous studies reveal that gesture and movement facilitate singing and musical understanding. Greenhead (2000) argued that if training exercises do not travel through space and use weight, they are not really movement training. The teacher needs to provide different styles of movement activities and should know how to use weight, space and energy to enhance movement functions. A dynamic posture achieved via movement training travelling through space is better than simply asking the children to stand still with a verbal reminder. Conventionally, we teach the correct posture without singing. So the singer's sitting and standing posture are good without producing sound. Once they sing, their body tends to tense up. Therefore, teaching posture while singing is important, and movement training to enhance the body functioning is the root.

The process of developing and testing the movements and gestures has therefore brought into focus several important questions about how to select material for choral training. Within this thesis, some of these movements/gestures were taken from pre-existing method books and dissertations, whilst others came from my own research and ideas based on reading and experience. So it is appropriate to discuss the value of these movements now that an objective measurement of them has been undertaken. Prior to doing this, three general points should be made. Firstly, according to the results of the pilot study, children do naturally use gesture to describe their voices. Although the gestures discovered in this thesis reflected the children's perception of the melodic contour, the metaphor of movement always worked successfully to achieve a good singing tone. In other words, the gesture metaphor helped the children to perceive the correct melody and it was easy for them to make gestures. But it is also important to recall that gesture alone was insufficient to achieve a beautiful sound. In order to improve singing skills, it seems that more specific gestures need to be used which offer some special singing assistance. Secondly, choral trainers do use gestures of varying sorts, but they tend to develop these from intuitions (as I did myself at places in this study). The variability of my results indicates that actually careful, systematic work is necessary to ensure the exact purpose and usefulness of a particular gesture. Thirdly, during this thesis, I have often written about the 'accuracy' of a gestural effect. My experience in this study has indicated that 'accuracy' might be a relative concept which depends on the specific situation, the individuals and groups concerned. However, having worked with the participating children and tested them several times, I now have grounds to support most of my instructions regarding gestural purposes in the current study and to suggest exactly why and how my selected gestures worked/did not work in context.

Generally speaking in view of the existing literature and my own experience, the gestures of VP1 and VP2 were designed for developing a good singing habit such as encouraging the children to drop the jaw, relax their tongues, round the lips and open the throat. Those of VP3, VP4 and VP5 were designed for more advanced singing skills for developing a whole body sensation to overcome some technical difficulties.

1. VP1

ti te ti te   ti te ti te ti------

The major problem for children when singing this pattern is the unclear nature of the jumping intervals and a potential dead vocal tone through unfocused pitching. The gesture of two hands circling serves several functions: (a) it fosters a good preparation for a successful onset of the singing tone—naturally lifting the soft-palate, (b) it creates enough space for singing the 3rd interval, (c) it provides focus and internal space for vowels (e. g. hand gesture forward for the bright vowel "ee" and backward for the darker vowel "eh"), and (d) it helps singers to develop a physical sensation of breath movement and flow so as to develop a musical sense of flow. The end of the gesture, sending a hand forward, establishes a sensation of sustaining and focusing the final note. Thus, the circling gesture not only serves to establish good habits for singing, but also creates a more flowing and musical vocal line. It achieves focus and intensity, and gives life and vigor to the tone. According to the results obtained in this study, this gesture was not so efficient for the individual tests. The non-significant result might be because the difficulty of this pattern is in the particular vocal range selected. The exercise just stayed in the middle range and so the effects on intonation and tone quality were perhaps not particularly tested.

2. VP2

The problems of this kind of sung pattern are similar to VP1. In addition to the functions mentioned in VP1, the hand circling used here near the ear is to develop children's singing support, focusing on the mask and promoting an open throat. In particular, the last sending gesture serves as a very good preparation to create space when changing vowels from "ee" to "ah". Additionally, this gesture seems to help to improve musical flow. The variable of expression was not measured in this current study. However, observing the performances of the children, we can gather that this gesture provides a very good sensation for expression in singing.

3. VP3

An open arm to the side with bending knees proves a good preparation for singing high notes (e. g. good body alignment for singing a high note or range, lifting the soft-palate, providing sufficient space, energy and depth) and to prepare with a full body breath before singing. Therefore, children using this seem to prepare well for singing, without too much explanation. The gathering motion offers a very good sensation for mastering the singing of a high note followed by a low one (tense to relaxed). In particular, bending the knees helps to release tension, naturally relaxing the jaw, and giving support for singing in a high range. Because the gesture was designed to overcome the difficulty of singing high notes, the effect was very significant.

4. VP4

The difficulty of this pattern seems to be making a successful transition from the bottom to the top of the range. The general problem with this is the production of a

very shrill sound on the top note because of insufficient vocal control. Fingers interlaced and palms facing down, placed in front of the chest, gives a very safe and relaxed sensation for singing the first note. Pushing the hands down helps to make a successful transition from the bottom to the top note, creating the sensation of stretching and sliding for the big jump, and encourages more space, depth and energy for the high note. Bending the knees helps singers to release shoulder tension, removing any tension in the hips and lower back, which is extremely important when singing high. Releasing, by slowly returning the hands back to the start position, helps singers to become aware of the quality of the released sound. The results indicated that this gesture has a positive effect most of the time. Yet, the pushing motion offers a sensation of stretching and this seemed difficult to develop without additional training in movement.

5. VP5

The general difficulties and problems singing this pattern are (1) the high notes are in a high range—leaving the children with insufficient space for the top notes, and (2) thus causing a tight, dead tone. Drawing a circle to the sides with the hand when singing ascending notes gives the physical sensation of movement from low to high and this increases the energy and intensity, whilst imagining that something is being collected when singing the descending passages gives a physical sensation of movement from high to low to release the tension gradually. For the vocal technique, this not only helps to create vibrato in the sung tone to help singers extend their ranges, but can also create a round sound for the necessary hollow sensation to sing the darker vowel "oo". For musical expression, this gesture seems to improve a crescendo to diminuendo effect. Finally, this circling gesture helps to sustain energy through the phrase and keeps the sound moving. It seemed that this gesture and

bending knees gave a safe sensation for singing a difficult melody, as a result, a very positive improvement of intonation and tone quality was found. In addition to the successful gesture design, the more difficult patterns perhaps offered the children more room for improvement in over all test patterns.

Issues emerging from training

This study indicates that much is to be gained from gesture and movement training for young singers. The traditional choral rehearsal style seems to have been limiting the student's potential for expressive singing. Verbal descriptions and demonstrations dominate this kind of teaching strategy. Additionally in vocalisation, imitation has been used as a method of learning. Imitation may have an important place in learning and education, but it may not be sufficient for learning singing. I have been teaching using more conventional methods for several years now and have found some problems which the current research indicates can be solved through movement. Indeed, overall a teaching method to sort out those problems such as low motivation, less self-consciousness, low concentration and low achievement needs to be found, and the movement component can surely be integrated into this.

In my videoing the three different training techniques each session from the first to the last lesson and watching each of them after each session, I kept the records and reflections of each exercise and activity including children's individual and group behaviours, lesson structure, children's attitudes toward technology, the role of the teacher, classroom management and training technique effectiveness, students' response to teaching techniques, and relationships between and among the teacher and the students, and so on. In retrospect, all this data provides critical insights and the basis for the development of a new teaching method.

Looking at these notes and seeing the outcomes, I definitely enjoyed the gesture and movement teaching more than the traditional type. It was not only for the enjoyment; rather, the better effects on the student's singing achievement were easily observed. The kinesthetic learning style not only facilitated student learning and better understanding, but also, and I believe critically, assisted the communication between me and the students. I could quickly apprehend all the student's understanding on the task through assessing their gesture performance visually. This is I feel is impossible to achieve in a conventional teaching style. It was also a very good way to establish a common language between the teacher and students or among the students especially for a new choir. One of the most significant benefits of using gesture in choral contexts is that it offers an easily implemented tool for the teacher to express some thoughts which are sometimes difficult to explain verbally and conceptually, such as lifting the soft palate and singing legato. Most of the time, gesture can express much more clearly the subtler elements. From the teaching experience, I realised that in the control group a further explanation was always needed after some practice because the students did not conceptually understand the sensation I was asking them to achieve. In contrast, it was quite easy to get the desired sound through a simple gesture with Groups 2 and 3. In particular in the movement group, the children not only performed better but were also able to express more even in song singing. Through simple reminders such as "can you sing this song with the sensation that we just did in the movement", the children could easily produced the musical effect in the song.

Although the gesture group (Group 2) generally scored higher in their singing than the control group (Group 1), I found that they sometimes had difficulty in expressing movements due to lack of travelling experience. In the longer term, overall movement training seems to save rehearsal time. Although much time in warm-ups is necessary at

the early stage, children perform much better once they are acquainted with or have internalised these sensations, and thus seem more able to apply the movements.

From the class video reflection, it was easy to find some important points for movement training:

1. The students should be trained gradually to stand. If teachers asked them to stand for more than 10 minutes, their concentration diminishes.

2. Gesture has different effects in the different groups. This could have been because of different levels of understanding between Group 2 and Group 3. For example, it was very easy to make a circle for Group 2 because circling had been practised in their physical classes. Therefore, I found sometimes that for children of the same age but different experience, the understanding of gesture was also different. This also implies the impossibilities of setting a standard programme for a semester for all school children. Thus, it seems important that the teacher observes and modifies their instruction and verbal description guided by the student's responses. Indeed, I often subtly restructured the lesson plan.

3. Movement classes need space. Such an open-space is sometimes difficult to control. In order to prevent overexciting the children it seems that the class arrangement is an important aspect for the teacher.

4. In the beginning, the teacher may spend time working on the physical training. Initially it is very important to make these movement classes fun in order to make the children feel 'safe'.

5. Appropriately positive feedback and praise of the gesture or movement performance was critical in enhancing the children's confidence and interest. I found it was best to point out the specific goal they had achieved, for example: "you did the circling very smoothly and kept it forward which is really good".

Boys and girls also differed. Girls were more able to be flexible and adventurous in their movements and so more physical demands related to precision could be made. Therefore, perhaps more praise needs to be given to boys to encourage them.

According to empirical results and my own reflection from the practical work, music educators should encourage students to be aware of the importance of physical experience and to include gesture and movement activities into the music curriculum. It suggests that a specific technique of gesture and movement training would be beneficial for singers, music educators, music teachers, choral conductors, dancers, actors and professional speakers.

Research from this study has important implications for conducting classes and teacher training programmes. The variety of physical activities and different gestures should be explored to learn how gesture and movement can be used to address various facets of the choral rehearsal such as conducting gesture, warm-ups, enhancing choral quality, and solving vocal problems. In a conductor class or teacher training programme, the students and teachers should understand the effectiveness of a movement-based teaching pedagogy and should be encouraged to experiment with their own conducting gestures so that they can know better the relationship between conducting gestures and choral tone. Consequently, they will develop wider gesture repertoires to enhance their communication rather than simply conducting the metrical patterns. It is of benefit if the conductor can add these gestures to their conducting repertoires and use these gesture s for reminding the singers of these technical aspects during a performance.

The results of this study indicated that movement has a positive influence on vocal technique. Students and teachers of singing should regard singing as a physical event

and explore physical exercises that can influence the coordination of muscles necessary to sing efficiently.

A final implication to emerge from this study is for Taiwanese choral education especially for children's choirs. Although the room space is always limited for doing movement activities for travelling through in space, students can do some movement activities outdoors before they enter the rehearsal room or for a supplemental teaching tool.

Recommendations for future research

From the results of this study, the following suggestions and recommendations for future research are made:

1. Although the use of gesture and movement as a rehearsal strategy in choral training has been comprehensively identified in recent years (Wis, 1993 & 1999; Hibbard, 1994; Aylen, 1998; Chagnon, 2001), there had been only a limited discussion of the techniques for children's choirs. This study has taken a step in the direction of defining some gestures for specific vocal patterns which could be applied in song singing for children. Because it is pioneering research, the gestures used in this study for children need to be further explored and refined into a repertoire. The possibilities for future research in this area are extensive. Similar research may interview and observe some choral directors who use gesture techniques in children's choir to understand better how children use gesture and what kind of gestures are more appropriate in a specific context.

2. The results of this study have shown that the gestures for different age levels might have different effects because of the differences in physical development and experience. In addition, gestures for singers of different capabilities or different

levels of choirs (beginner, intermediate and advanced) might cause an entirely different outcome. As discussed previously, it is assumed that if the voice has been well developed, the coordination of voice and gesture might be easier to achieve than for those whose voice has been less developed. Additionally, the appropriateness of gestures for girls and boys might be different as their approval and attitude towards them are different. Further studies may examine the different gestures in a variety of age groups, singing capacities or gender to determine if the training technique is effective with different types of singers; they may also explore more gestures for children which may not have been addressed in this study.

3. It might be also important to know the gender differences in learning and teaching. If the gesture model is provided by a female and a male teacher, different outcomes may be produced. Furthermore, a separation of boys and girls may also cause different results.

4. According to the research model, if the singers have internalised the sensations of motor images, they will perform successfully without having to use gesture or only having to look at the conducting gesture. This present study is limited to testing the effect. A further research could use the same procedure designed for this research to test singers' recognition of conducting gestures. In addition, similar studies could be conducted with a comparison of the children with gesture and no gesture training on recognition of conducting gestures or ability to produce sound.

5. Testing needs to match training in a very controlled manner. The development of measurements possessing high validity and reliability while being sufficiently short to be appropriate for use with primary school children would provide an essential tool for future researchers. There may be some simper standard tests to measure children's singing achievement, and to reduce rater's tiredness, which could lead to

a more accurate assessment.

6. In order to prevent monotony or overuse of gesture, a replication of this study could test different gestures in the pretest and posttest. Testing some gestures children have not done in the class could also lead to a better result.

7. Dalcroze Eurhythmics has long been widely adopted by music educators to develop students' overall musical ability. The application of this kind of method in warm-up sessions for enhancing singer's body awareness and efficiency, and improving gesture expression for singers is less discussed. To establish a systematic and sequential Dalcrozian type movement training to support and enhance gesture quality for singers is also important. In future studies, researchers might explore more specifically the effects of different types of Dalcrozian movement exercises for improving particular gesture sensations.

8. A longer treatment period may produce a different result especially for the testing of movement training effect, if the children have received a period of Dalcroze Eurhythmics instruction.

9. A study to compare a new choral conductor's gesture technique and expression to those who have received gesture training, or a combination of gesture and movement training, would also be helpful to know whether this kind of training technique produces a more effective conducting gesture and communication.

10. Although the effect of gesture and movement training in improving children's intonation and tone quality is evident in the present study, other elements of performance, such as dynamics and expression, also aid improvement. Replications of this study might make use of different dependent variables to see if the effect of gesture and movement training make any progression in other aspects. Research should also be extended beyond intonation and tone quality to determine if there are other applications of movement in the choral setting.

11. The choir members were selected from an intact classroom (in this study the children were randomly selected from two classrooms, so their homogeneity was still very high) and a completely random selection may cause different results in adopting gesture and movement training. Further research could use the same procedure to compare the homogeneity and the different characteristics of choirs.

12. Finally, further investigation is needed because of the small sample sizes in the current research. Normally, a choir consists a minimum of 17 to 18 choral members (it is the case in this present study) and often many more. The larger sample sizes might produce different results or difficulty.

The current thesis has made important inroads into researching children's choral singing. Its importance seems more generalisable than the specific setting for which it was initially aimed: Taiwanese education. But it is important to point out that such singing is extremely popular in Taiwan and effects such as gender differences may be different in other cultural settings where choral singing with this age range is less popular. But, for the Taiwanese the positive implications of Dalcrozian movement training is obvious. This study has had a profound impact upon the current author and provided her with fresh insights into her practical work as a choral trainer. In addition, it has enthused her to undertake further studies to understand the link between theory and practice more deeply.

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APPENDICES

APPENDIX A

GUIDELINE QUESTIONS FOR PILOT STUDY
INTERVIEWS WITH CHILDREN

Part I: Musical background

1. Do you like music?

2. Do you learn or have ever learnt an instrument? How long? Which grade?

3. Do you like singing? Does your family like singing? Do you listen to song

    cassettes?

4. Have you have learnt dancing, movement or gymnastics?

Part II: Mirror (Exploring voice and gesture on a spot)

1. Imitation (1) action (2) action + sound

2. Creation (1) action (2) action + sound

3. Discussion of the link of voice and gesture

    ● When you are doing this task, what do you think about action first, or sound?

    ● Do you remember what you have done just now?

    ● Discussion: Do you find any difference when you are singing with/without

       gesture? (Discuss some gestures what s/he has done)

Part III: Shadow (Exploring voice and movement travelling in space)
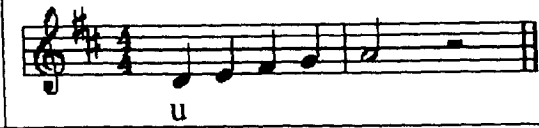
1. Follow (1) action (2) action + sound

2. Creation (1) action (2) action + sound

3. Discussion of the link of voice and movement

    ● When you are doing this task, what do you think about action first, or sound?

    ● Do you remember what you have done just now?

    ● Discussion: Do you find any difference when you are singing with/without

       movement? (Discuss some movements what s/he has done)

Part IV: Vocal pattern and gesture

1. Listen to the vocal pattern

2. Can you describe this sound by your gesture?

3. What makes you do this gesture?

4. Could you do this gesture with singing?

5. Does it match your sound? Do you want to try another gesture?

6. This time, what makes you do it differently?

7. (Giving direction), Can you do it again?

8. This time, what makes you do it differently?

9. Do you want to try my gesture?

10. Do you find it easier to sing with/without gesture or the same?

11. Correction gestures: what do you feel? Does it make you sing better?

APPENDIX B

VOCAL PATTERNS AND GESTURES

FOR CHILDREN'S INTERVIEWS

Pitch progression	Vocal pattern	Gesture
Single note *High*	u	Projecting
Single note *Medium*	du	Pointing
Single note *Low*	o	Sending arms forward
Ascending *Steps (1-5 scale)*	u	Pushing
Descending *Steps (1-5 scale)*	u	Raising hand
Ascending+Descending *Leaps + steps*	ng a e i	Side swinging
Descending+ *Steps + leaps*	m i a	Ear side circling
Ascending+Descending *1-5 minor arpeggios*	u	Gathering
Descending *Staccato (Leaps)*	u	Flicking
Sliding Big jump	i a i	Swinging side to side Pushing down and releasing

Note: All the gestures can be seen in VCD track A.

APPENDIX C

CLASS EXAMPLES

(PROGRAMMES OF LESSON 3, 10, 18)

Lesson 3: 22nd, September 2000

| Group 3 |

Relax, Duration and Balance

1. Walking 4 beats, relaxing body 4 beats.

2. Walking 4 beats, stretching body 4 beats (listening to the music while walking).

   [Purposes: to relax body, to enhance body sensitivity to music]

3. Walking 4 beats, growing to a shape and balance.

   [Purposes: to develop the balance, to develop the sensations of hand gestures]

4. Practice different body shapes on a spot with partner (hand-up, hand-down, round-hand, body-twist). (8 beats)

   [Purposes: cooperating with others to improve group dynamics, to develop concentration]

5. Walking 4 beats, exhaling—"tze" 4 beats (bending knees and pushing hands forward)

   [Purposes: to focus the tone, to feel the sensations of breathing against the air]

Breathing

1. Inhale—exhale 8 beats.

2. Si-Feng-De-Whua 西風的話—song with breathing

   [Purposes: practise breathing management]

3. Group in a circle—pushing hands against neighbours. From relax to tense by following the phrase. Change direction by next phrase.

   [Purposes: practise breathing management, to enhance phrasing concepts, to improve group dynamics]

Focus and direction (Review)

1. Now, you are going to walk in the room. But you are only allowed to go in a straight line.

2. You need to walk by looking at one point on the wall. And go for that point.

3. When I clap, you need to change to another direction, looking where you are going before you go!

4. Doing the same, running.

5. Now, you are only allowed to walk in curves. When you meet somebody, you have to look at his/her eyes. And call his/her name.

6. Running.

7. Put objects in the space.

   [Purposes: to develop coordination and control, to have the sense of directions, to develop eyes focusing]

Sliding ♪ (i-a-i) + concepts of vocal line up and down

1. Fingers interlaced and palms facing down placed in front of the chest.

   When your hands move up, you need to produce a higher sound. As slowly as possible.

   [Purposes: to enhance the perceptions of intervals, to focus and even out the tone]

2. Exploring the voice sliding up and down by yourself.

3. Individual practice by following the teacher's demonstration.

4. Find a partner. One sings and the other moves the hands.

   [Purposes: to develop the coordination of voice, gesture and ear]

5. Group: can you sing 1-5-1 with hands up and down? Comfortable?

6. Can we try with hands down and up? Gesture practice.

   [Purpose: to create a correct motor image for singing sliding]

7. Follow the piano. Can you do this by side swinging?

   [Purpose: gesture variation]

Song Singing

Textbook: p.11 風鈴草 (Feng-Ling-Tzau)

Lesson 10: 24th, October 2000

| Group 3 |

Gesture expression with tone quality

(Music: fast tempo--God rest you merry gentleman, slow tempo:
Schubert—Wiegenlied)

1. Students sit in a circle

2. Begin with one person to throw a tone to anyone, and that child needs to 'catch' the

    tone and passes it to another one. (Throw on first beat, catch on second beat)

    [Purposes: to develop expressive hand gesture, to develop the sensation of vocal

    line and projecting, to enhance group dynamics]

Physical warm-up: Canon

1. Movement canon (interrupted canon)

    Teacher's movement (M) for 4 beats, students imitation the movement for 4 beats.
    | teacher M1 | students M1 | teacher M2 | students M2 |

2. Movement canon (continuous canon)

    Teacher: | M1 | M2 | M3 |
    Students: | rest| M1 | M2 | M3 |

3. Vocal canon (interrupted canon), sing with major chord notes

4. Vocal canon (continuous canon)—harmony from 2 parts to 3 parts singing

Ex: teacher:

Students:

[Purposes: to develop the sensitivity to nuance and harmonic sensations]

Tone quality—music: Canon

1. Review.

2. Can you draw a circle in the air, going forward? 2 beats in one circle?

3. Use only index fingers—light, use hands—heavy.

4. Now you are going to walk and draw the circle.

5. Then you need to listen to the piano. When it's louder, you need to draw a bigger circle.

6. Sing while drawing the circle.

7. Sing without gesture.

   [Purpose: to develop the hand sensations for different quality of sound, to develop the sensations of flowing, to practise expressive hand gestures]

Vocal warm up

1. Sing with gesture, ear circling.

   m   i   a

2. Review

   a—i—a—i—a—i

Song singing

1. Review: 森林裡的小鳥(Birds in the forest)

2. New song: 我的小笛子(My little flute)—two parts singing

Lesson 18: 1st, December 2000

| Group 3 |

Rhythmics—Quick reaction 1

Rests game (clapping)—(walking) with music "Jingle Bells"

(phrase1—walking 8 beats; phrase2—walking 7 beats and clapping 1 beat;

phrase3—walking 6 beats and clapping 2 beats......., phrase 8—clapping 8 beats)

   [Purposes: to enhance inner pulse, to develop body control and coordination]

Rhythmics—Quick reaction 2

1. Sit in a circle.

2. Listen to the music to judge the dynamics.

3. Use index finger to tap the ground for soft sound; 5 fingers to tap the ground for

   medium volume; and whole arm with a fist to tap the ground for loud sound.

4. Signal: change another hand.

   [Purposes: to develop a quick response to music dynamics and quality, to enhance

   the gesture quality]

Breathing and vocal warm-ups

Exercise#1

1. Preparation for staccato.—blowing air out into a straw

2. Review

   hi   he   a

   Gesture: fist shaking for staccato, drawing a line in the air for legato

Exercise #2

3. Review

Gesture: Stand on the right leg (weight on the right—down)

Bending knees at the top note (sliding) and releasing for final note.

Exercise #3

4. Find a partner, face each other. Bending knees with right leg forward.

5. Open palm of right hand to touch the partner's.

6. When the person pushes hand forward to the partner, s/he exhales out and the partner inhales.

7.

One person pushes hand forward to sing ascending, and the other pushes back for singing descending.

[Purposes: for tone focus, vocal line evenness]

8. Gesture: pushing hands forward and straight (palm facing out). Swinging one hand round to the back while singing ascending, and releasing back while singing descending (eyes focus on ring finger).

[Purposes: for tone focus, for crescendo and decrescendo, releasing tension]

Song—two parts singing

1. Do Re Mi

2. 平安夜 (Silent Night, Holy Night)

3. Jingle Bells

Note:

1. Group 2 followed the same contents except movement training travelling through space.

2. Group 1 followed the same contents except movement training tavelling through space and did not use gesture.

3. Some of the movement games and gestures can be seen in VCD TRACK A, B, C and D.

APPENDIX D

MEASUREMENT MATERIALS

Six Vocal Patterns
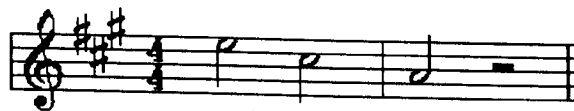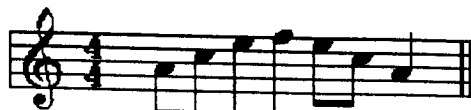
Note: Gestures for these gestures can be seen in VCD track D.

Five Excerpts

蛤蟆歌 (Ha-Ma Ge)　Chinese Folk Song

一隻蛤蟆　一張嘴，　兩個眼睛　四條腿
Yi zhi ha-ma　yi zang zui　Liang ge yan jing sze tiao tui

本事 (Ben-Shih) Chinese Art Song

記　得　當　時　年　紀　小
Ji　de　dang shih　niang- ji　hsiao

茉莉花 (Mo-Li Hua)　Chinese Folk Song

讓我來將你摘下，　送給別人　家
Rang wo lai jiang ni zhai xia　Song gei bie ren　jia

在銀色月光下 (Tzai Yin Sheh Yue-Guang Xia) Chinese Folk Song

你在何處躲藏，　久別離　的姑　娘
Ni tzai heh chu duo tzan Jiu bie li　di gu- niang

散塔盧琪亞 (San Ta Lu Chi Ya) Italian Folk Song

夜已昏　欲何待　快回到　船上來，
Yeh yi hun　yu heh dai　Kuai hui dao chuan shang lai

散塔盧琪亞，　散塔盧琪亞
San ta lu chi ya　San ta lu chi ya

APPENDIX E

GESTURE DESCRIPTION AND ANALYSIS

FOR VOCAL PATTERNS

Vocal Patterns and Gestures

Vocal Pattern 1

ti   te ti te   ti te ti te   ti------

1-1 1-2   1-3   1-2   1-3   1-4 (time-space)

Gesture #1: Both hands circling, and slowly extending one arm forward
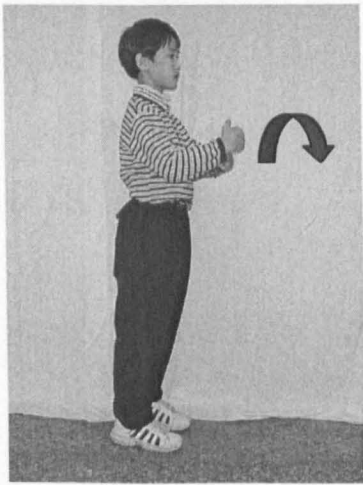
1-1
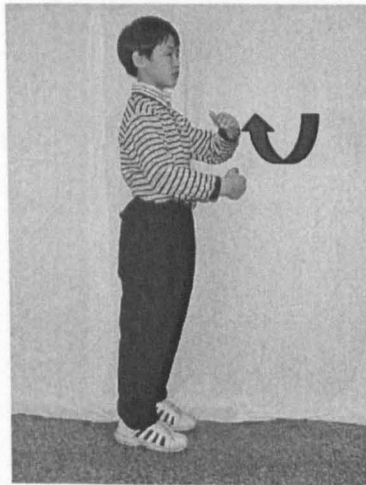
1-2   (ti-te)
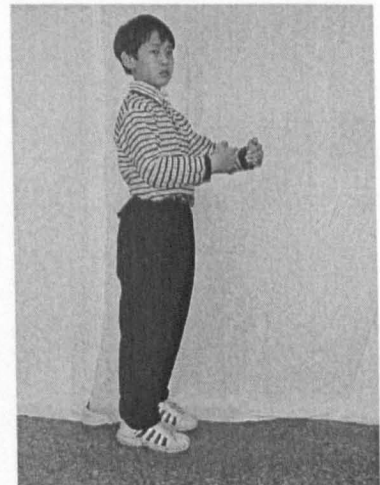
1-3 (ti-te)
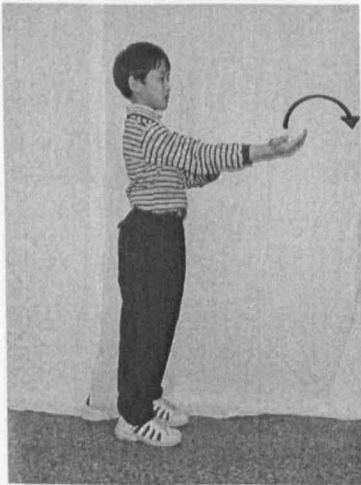
1-4 (ti)

Vocal Pattern 2

m   i   a

↓   ↓   ↓   ↓ ↓↓ ↓   ↓

2-1 2-2 2-3 2-4 2-2 2-3 2-4 2-5 (time-space)

Gesture #2:   Ear side circling, and then extending one arm
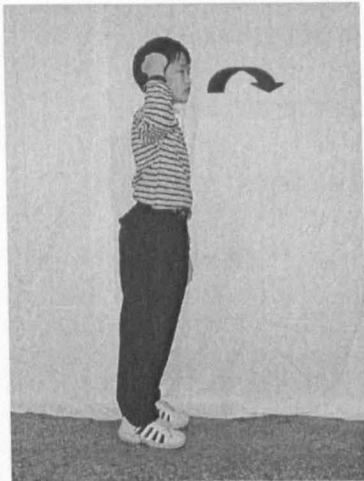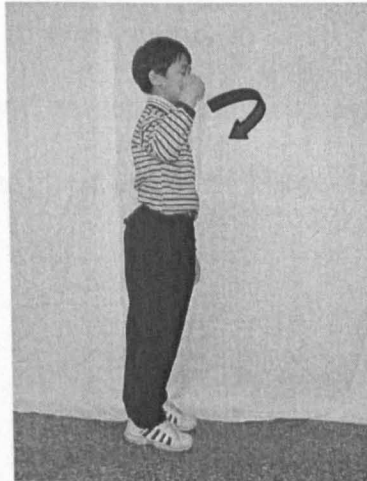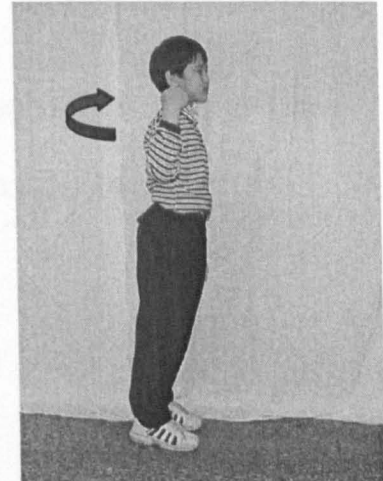
2-1   2-2 (m) (i)   2-3 (m) (i)
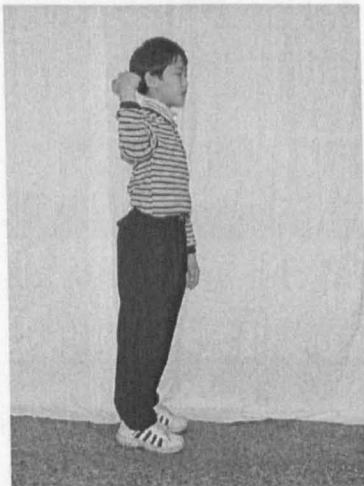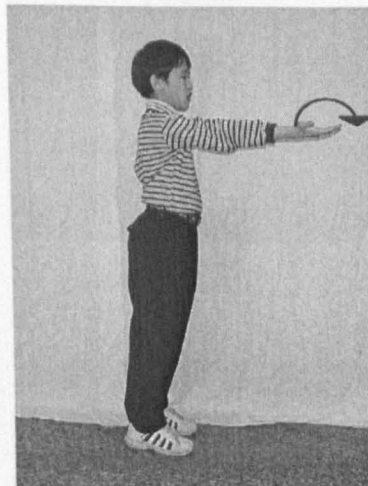
2-4 (m) (i)   2-5 (a)

Vocal Pattern 3
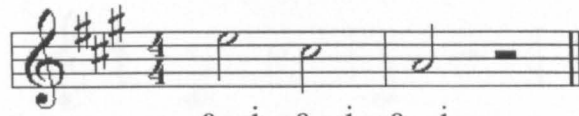
a—i—a—i—a—i

3-1   3-2   3-3 3-4 3-5 (time-space)

Gesture #3: Gathering

Gesture Description

1. Bending knees to a half squat position with the torso remaining upright.

2. Extending the arms to sides, palms up

3. As the pitches descend, sweeping the hands inward to the middle and then lifting the arms to the chest level (slowly extending the legs to normal position).
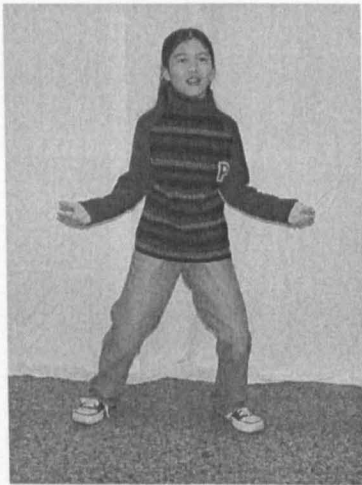
3-1 (ai)
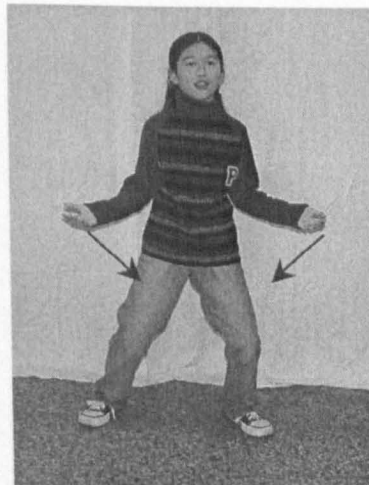
3-2 (ai)
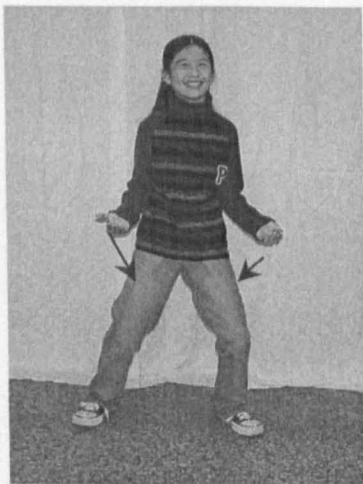
3-3 (a)
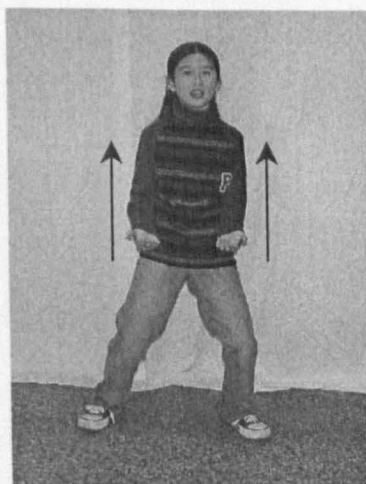
3-4 (i)
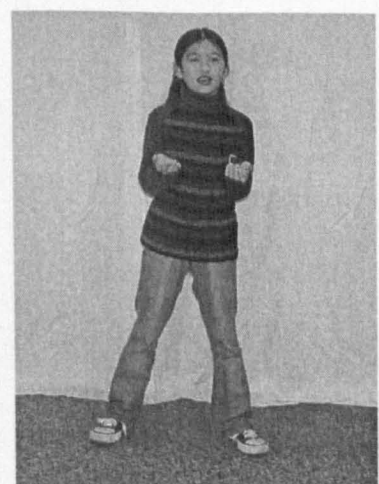
3-5

Vocal Pattern 4

i a i
4-1 4-2 4-3 4-4 4-5 (time-space)

Gesture #4: Pushing down and releasing

Gesture Description

1. Fingers interlaced and palms facing down placing in front of chest when singing the first note.

2. Pushing hands down and bending knees when singing the sliding octave.

3. Pulling hands up and releasing the tension gradually upwards then singing the final note.
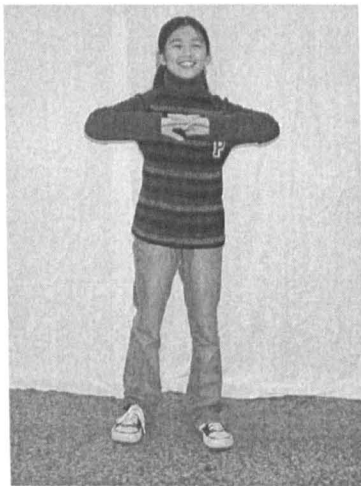
4-1 (i)
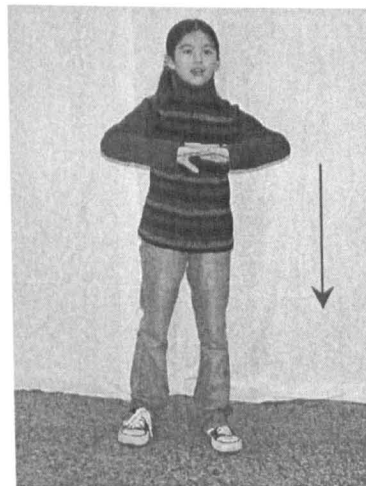
4-2 (a)

4-3

4-4 (i)

Vocal Pattern 5

5-2   5-4   5-6

5-1   5-3   5-5   5-7 5-8 (time-space)
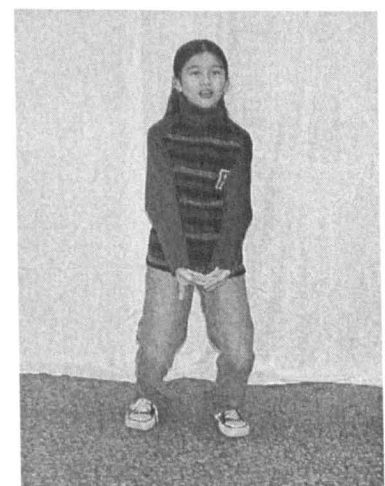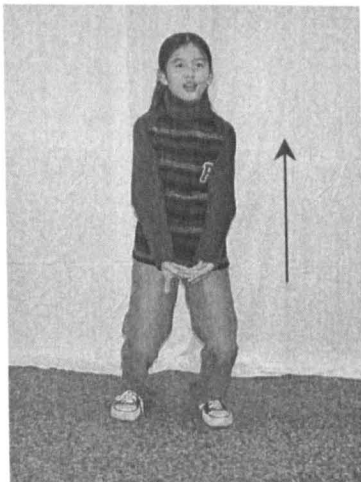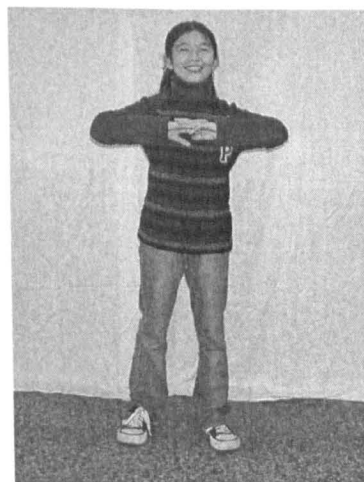
Gesture #5: Circling and pulling hands inwards towards the body

Gesture Description

1.   Bending knees, hands drawing a circle to sides when singing ascending.

2.   Pulling hands inwards towards the body when singing descending.

VP5-1   VP5-2   VP5-3   VP5-4

VP5-5   VP5-6   VP5-7   VP5-8

Vocal Pattern 6

i   o   u

5-1

5-2   5-3   5-4 5-5 (time-space)

| **Gesture #6**:   Flicking |

Gesture Description

1. Flicking to get the sensation of light staccato

2. Raising hands up when singing 5 notes descending
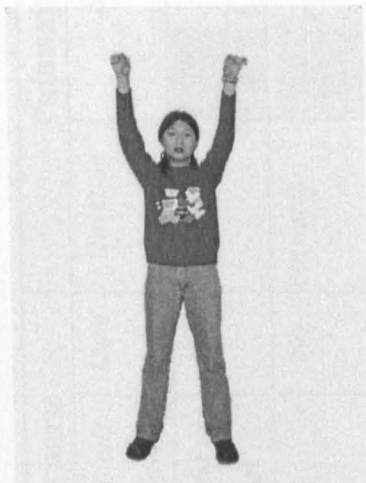
6-1
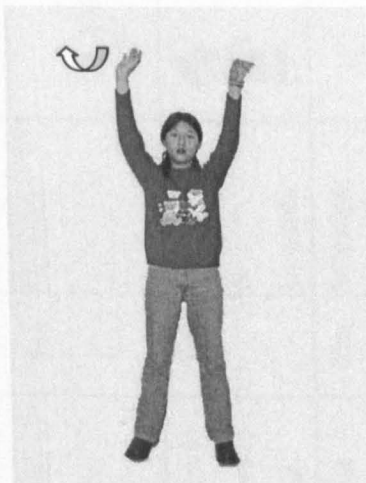
6-2 (i)
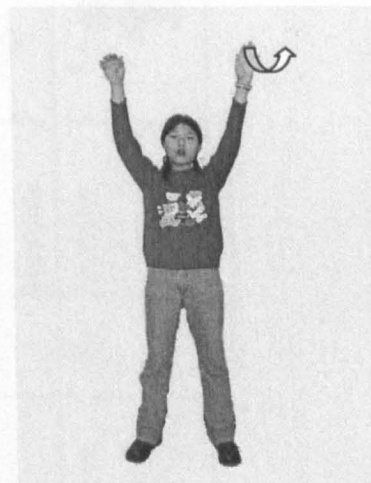
6-3 (o)
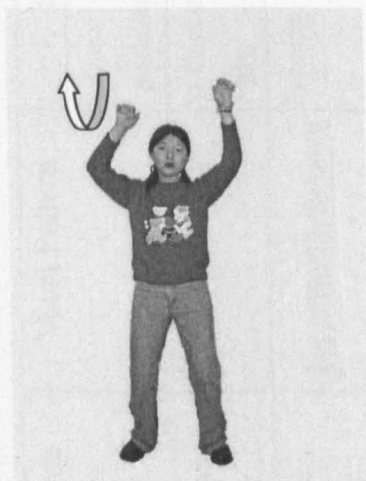
6-4 (u)
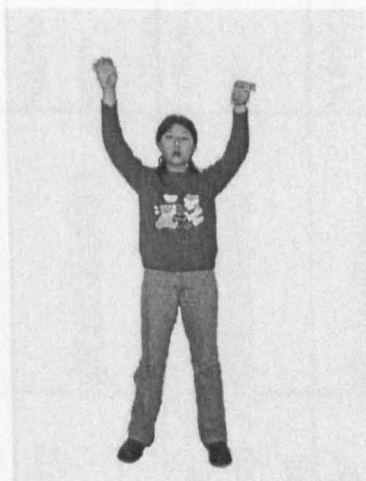
6-5

One Song—Chinese Art Song

西風的話 (Si-Feng-De-wha)

mp

去 年 我 回 去，你 們 剛穿新棉 袍。
Chui-nein wo whei-chui, Nee-men gan chuan sin mien-paou

mf

今 年 我 來看 你 們，你 們 變胖又變 高。
Jin-nein wo lai kan nee-men, Nee-men bien pan yo bien gau

f

你 們 可 記 得，池 裡 荷花變蓮 蓬。
Nee-men keh ji--de, Cheh li whe-whua bien lien-pong

mp
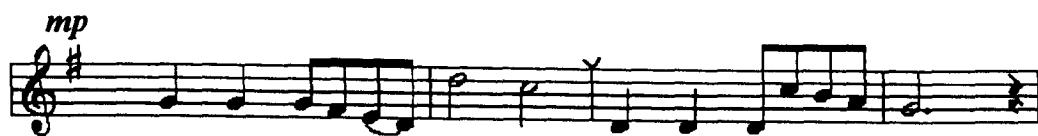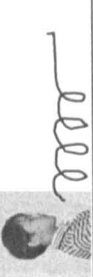
花 少 不愁沒 顏 色，我 把 樹葉都染 紅。
Wha sau bu chou mei yien-sheh, Wuo ba su-yieh dou jan whuen

Note: Gestures for this song can be seen in VCD track D.

Analysis of Gestures

Gesture	Name	Vocal Pattern	Body parts				Pathway		Qualities (Effort)			
			Hands position	Hands level	Knee bending	Direction	Shape	Time	Space	Weight	Flow	
1	Both hands circling		In front of body	Chest to waist	No	Forward		Sustained	Flexible	Light	Free	
2	Ear side circling		Ear side	Ear	No	Forwards		Sustained	Flexible	Light	Free	
3	Gathering		Sides to centre	Knees to waist	Yes	Upwards		Sustained	Flexible	Firm	Bound	
4	Pushing down and releasing		In front of body	Chest to knees to chest	Yes	Downwards & Upwards		Sustained	Direct	Light Firm	Bound	
5	Circling		In front of body	Waist	Yes	Sideways & Forwards		Sustained	Flexible	Firm	Bound	
6	Flicking		Sides	Above head	No	Upwards		Sudden	Flexible	Light	Free	

APPENDIX F

RATING SHEETS: 9-POINT RATING SCALE

An Example: Individual—Vocal Pattern 1
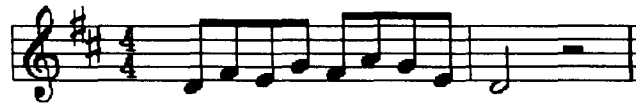
ti te ti te ti te ti te   ti-------

Poor ①---②---③---④---⑤---⑥---⑦---⑧---⑨ Excellent

Order	音準 (Intonation)	Order	音色 (Tone Quality)
1	①--②--③--④--⑤--⑥--⑦--⑧--⑨	1	①--②--③--④--⑤--⑥--⑦--⑧--⑨
2	①--②--③--④--⑤--⑥--⑦--⑧--⑨	2	①--②--③--④--⑤--⑥--⑦--⑧--⑨
3	①--②--③--④--⑤--⑥--⑦--⑧--⑨	3	①--②--③--④--⑤--⑥--⑦--⑧--⑨
4	①--②--③--④--⑤--⑥--⑦--⑧--⑨	4	①--②--③--④--⑤--⑥--⑦--⑧--⑨
5	①--②--③--④--⑤--⑥--⑦--⑧--⑨	5	①--②--③--④--⑤--⑥--⑦--⑧--⑨
6	①--②--③--④--⑤--⑥--⑦--⑧--⑨	6	①--②--③--④--⑤--⑥--⑦--⑧--⑨
7	①--②--③--④--⑤--⑥--⑦--⑧--⑨	7	①--②--③--④--⑤--⑥--⑦--⑧--⑨
8	①--②--③--④--⑤--⑥--⑦--⑧--⑨	8	①--②--③--④--⑤--⑥--⑦--⑧--⑨
9	①--②--③--④--⑤--⑥--⑦--⑧--⑨	9	①--②--③--④--⑤--⑥--⑦--⑧--⑨
10	①--②--③--④--⑤--⑥--⑦--⑧--⑨	10	①--②--③--④--⑤--⑥--⑦--⑧--⑨
11	①--②--③--④--⑤--⑥--⑦--⑧--⑨	11	①--②--③--④--⑤--⑥--⑦--⑧--⑨
12	①--②--③--④--⑤--⑥--⑦--⑧--⑨	12	①--②--③--④--⑤--⑥--⑦--⑧--⑨
13	①--②--③--④--⑤--⑥--⑦--⑧--⑨	13	①--②--③--④--⑤--⑥--⑦--⑧--⑨
14	①--②--③--④--⑤--⑥--⑦--⑧--⑨	14	①--②--③--④--⑤--⑥--⑦--⑧--⑨
15	①--②--③--④--⑤--⑥--⑦--⑧--⑨	15	①--②--③--④--⑤--⑥--⑦--⑧--⑨
16	①--②--③--④--⑤--⑥--⑦--⑧--⑨	16	①--②--③--④--⑤--⑥--⑦--⑧--⑨
17	①--②--③--④--⑤--⑥--⑦--⑧--⑨	17	①--②--③--④--⑤--⑥--⑦--⑧--⑨
18	①--②--③--④--⑤--⑥--⑦--⑧--⑨	18	①--②--③--④--⑤--⑥--⑦--⑧--⑨
19	①--②--③--④--⑤--⑥--⑦--⑧--⑨	19	①--②--③--④--⑤--⑥--⑦--⑧--⑨
20	①--②--③--④--⑤--⑥--⑦--⑧--⑨	20	①--②--③--④--⑤--⑥--⑦--⑧--⑨

APPENDIX G

SUPPLEMENTARY QUESTIONAIRE

Chinese Original Questionnaire

小朋友請仔細的回答每一個問題

第一部份：關於手勢

1. ＿＿你覺得邊唱邊比動作，會幫助你唱的比較好嗎？

   ❶反而更糟❷還好❸有時候❹常常❺總是

2. 你覺得手勢幫助你什麼？對的就打✓

   ＿＿聲音更容易集中，不會亂跑。　　　　＿＿音比較準

   ＿＿尾音唱的比較穩，比較長　　　　　　＿＿比較有感情

   ＿＿幫助我想像音的形狀　　　　　　　　＿＿拍子比較準

   ＿＿如果還有其他原因請寫出來

3. 你喜歡邊唱邊比動作？☐喜歡　☐不喜歡

   如果不喜歡，爲什麼？

4. 當你邊唱歌邊比時，你是：☐聲音跟著手唱出去　☐手隨著聲音來動

   　　　　　　　　　　　　☐不知道，沒有在想

第二部份：關於律動

1. 在上課中你喜歡有律動遊戲嗎？　☐非常喜歡，　☐喜歡，☐還好，

   　　　　　　　　　　　　　　　☐不喜歡　☐非常不喜歡

2. 爲什麼你喜歡有律動遊戲？

   ☐好玩，☐唱歌比較不緊張，☐很容易把律動的感覺帶入歌中，更有感情

   其他原因請寫出來

3. 老師要你身體做動作，隨著音樂而走路或用手畫線條，你覺得：

   ☐很自然，不會不好意思　　　　☐很不好意思

   ☐剛開始不好意思，久了之後就習慣了

English Translation of Questionnaire

Part I: Gesture (for Group 2 and Group 3)

1. ____Does gesture help you sing better?

❶ It does not help me at all. ❷ It does not make much difference. ❸ It sometimes helps me. ❹ It helps me most of the time. ❺ It always helps me.

2. How does gesture help you ? tick ✓what you think.

____tone focus   ____better intonation

____sustaining and supporting the final note   ____be more expressive

____ imaging the pitch contour   ____be more accurate rhythmically

____others: (please specify/explain)

3. Do you like to sing using gesture ? ☐Yes   ☐No

If no, why not?

4. When you sing using gesture, ☐ does your voice follow the gesture? ☐do your gestures follow the voice? ☐I am not aware of it.

Part II: Movement (for Group 3)

1. Do you like movement activities in the class? ☐Yes, very much.

☐Yes, quite a lot. ☐Yes, they are OK. ☐No, I don't. ☐No, I hate them.

2. Why do you like movement?

☐It's fun. ☐It makes me sing more easily and it makes me relaxed. ☐ It is easier to bring the movement sensation to singing, so I can sing more expressively.

Other reasons?

3. When the teacher ask you to do some movements, for instance: walking by following the music or drawing a phrase line in the air, do you feel:

☐It is natural, so not embarrassed at all.   ☐Very embarrassed.

☐Embarrassed at the beginning, but get used to it later.