

**Physiological Changes in the Adolescent Female Voice:  
Applications for Choral Instruction**

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## **The Adolescent Female Voice**

In adolescence, the human body experiences many of the physiological changes needed to mature from a child to an adult. One of the most noticeable changes occurs in the development of the voice. Most choral and private voice teachers, however, focus solely on the changes in the male voice simply because those changes are the most prominent. The danger in neglecting female students in the voice change and focusing solely on the male vocal changes is that female students are left to fend for themselves and often develop incorrect and harmful vocal techniques as a result of the lack of instruction. Students and teachers can cause great damage to the vocal cords and larynx, as well as hinder the potential of later vocal progress because of ignorance in this subject area. If a teacher understands the stages of development of the female voice, he/she can then serve as an informed guide to the student and facilitate the maturation of the vocal apparatus into a healthy and long-term instrument. Lynn Gackle, expert on the development of the female voice, stated:

Our challenge is to help young voices develop to their fullest present potential for personal self-expression. We must facilitate their vocal future rather than hinder that development or contribute to lifelong feelings of vocal inadequacy. We must also help students to understand that each voice is unique—that it grows or develops uniquely (Gackle, 1991).

The purpose of this project then is to give a basic outline of the anatomy of the vocal apparatus, a diagnostic methodology for the changing voice, to explore current research available to the vocal music educator, as well as ascertaining a group of concluding exercises intended to help the teacher guide the student to correct vocal practices and procedures as she develops through the vocal change.

### **Anatomy of the Voice**

In singing, unlike instrumental disciplines, the musician's instrument is his/herself. A director must understand the way the voice works in order to better instruct his/her student. For the purposes of this paper, only a basic outline of vocal anatomy will be given. A deeper and more scientific understanding than the one given here can be found in William Vennard's book, *Singing: the Mechanism and the Technic*. Understanding the anatomy of the voice begins with comprehending the anatomy of the larynx and how intricately this part of the vocal apparatus is tied into sound production. "The larynx is positioned in the throat by a series of suspensory muscles. It is anchored from below by muscular attachments to the sternum and the clavicles" (Doscher, p 30). There is one bone (the hyoid bone) and four major cartilages (thyroid, cricoid, two arytenoids, and epiglottis) which make up the structure of the larynx (Doscher, p 32). Inside of these cartilages and bone are stretched the fragile vocal folds (cords) of the human voice.

It is apparent that the vocal folds are an extremely complex tensing and relaxing muscle . . . The vocal folds seem to be multi-layered muscles, and their versatility of function is astonishing. They can shorten themselves, contract laterally, vary both the length and thickness of a vibrating segment, and even make part of themselves tense while the rest is relaxed. No man-made instrument can equal this kind of versatility (Doscher, p 37).

The vocal apparatus of a human being is a very complicated and awe-inspiring instrument. In recent years, more research has been done on the development of the vocal cords and tract, serving to give teachers and students of music a better understanding of how the human voice works.

At birth, the undeveloped vocal folds are the same length in both male and female babies (approximately 2mm) (NCVS, 2005). Eventually, after puberty, male and female vocal folds reach their mature length, approximately 28.21 mm for men and 23.15 mm for women (Kahane, 1982). “Menarche is the clear physiological landmark of puberty in females” (Thurman and Klitzke, p 700). This landmark event in a young woman’s life, serves as the indicator of the last stages of vocal development, as well as the time in which the voice is most fragile and the student may be frustrated with her sound and is therefore more susceptible to developing bad habits. As a result of the differing lengths, female voice pitches are roughly 75% higher than male voices. Based on research at the University of Pennsylvania, this

difference reflects not only a difference in vocal fold length, but also in vocal fold mass (Embick, 2001). Thurman and Klitzke confirm this statement maintaining that, “Pubertal maturation of the laryngeal anatomy includes the growth of all its muscles, particularly the adductory muscles and cricothyroid muscles” (p 701).

According to the National Center for Voice and Speech, while the female vocal change is often overlooked because there are no great outward physical characteristics to distinguish it, there are many changes during puberty in the female voice (NCVS, 2005). For example, as symptoms of these changes, females exhibit an increase in breathiness/huskiness in the tone, occasional cracking, a lowering of the average speaking pitch’s fundamental frequency, and an increase in pitch inaccuracy.

The nature of producing vocal sounds is a sequence of four virtually simultaneous physical processes: *Respiration* (breath is taken), *Phonation* (sound is initiated in the larynx), *Resonation* (the resonators receive the sound and influence it), and *Articulation* (the articulators shape the sound into recognizable units) (McKinney, p 27). These processes are the foundation of the vocal apparatus’s ability to produce sounds, both speech related and musical.

### **Diagnosing the “Changing Voice”**

James McKinney, author of *The Diagnosis and Correction of Vocal Faults*, recommends approaching the diagnosis of the voice in a scientific way.

When a student walks into your studio [classroom] he/she is entrusting you with one of his/her most precious possessions—his/her voice. It is imperative that you develop some of the same types of diagnostic skills acquired by a doctor” (McKinney, 1994, p 13).

McKinney insists that every teacher must have three things to equip him/her to be an effective diagnostician and therefore an effective teacher:

- 1) Comprehensive knowledge of the vocal mechanism and how it works
- 2) The ability to express yourself in terms the student can understand
- 3) Some of the skills of a master psychologist (McKinney, p 13-14).

Much of a music teacher’s job is wrapped in being a psychologist with the skills to use constructive criticism in a way that corrects the problem and at the same time does not irreparably harm the student’s perception of herself or her ability to perform music. “The teacher’s plan of action is to recognize symptoms, (*What is wrong with the sound I am hearing?*) determine causes, (*What is causing it to sound that way?*), and devise cures, (*What am I going to do about it?*)” (McKinney, p 17). One way to remember McKinney’s procedures would be to memorize the three D’s: **D**etect/**D**iagnose Symptoms, **D**etermine Causes, **D**evice a plan of action.

The teacher must be on constant watch with his/her eyes and ears for both the visual and audible clues a student is struggling with the vocal change. “Since the choral teacher is the only voice teacher most adolescents ever see, he/she must be able to train these voices while understanding and working

within their limitations” (Siple, 1995, p 8). Huls (1957) found that choral directors have a strong inclination for overestimating the potential of young voices. “Adolescents are able to develop their singing voices as long as teachers respect the physical, mental, and emotional capacities of their students” (Huls, in Siple, p 8). By using Lynn Gackle’s stages of development, the teacher will have a list of possible sights and sounds to watch and listen for in his/her classroom.

### **Current Research**

Four important areas of current research available to the music educator on the adolescent female voice are: 1) Stages of Development, 2) Adolescent Female Voices: Ranges and Tessituras, 3) Classification of Soprano and Alto, 4) Vocal Registers. Having an understanding of these four areas will create a more knowledgeable and capable teacher of adolescent female voices, thereby helping to ensure harmful vocal habits and practices do not develop.

### **Stages of Development**

The changes in the female voice begin one to two years before the changes begin in the male voice. Lynn Gackle bases her conclusions on the stages of development on “ten years of working with and observing female adolescent voices” and suggests these stages and approximate ages should only be used as a guide and should not be held as the sole and only “definitive indication of each stage of development” (Collins, 1999, p 140).



The first stage of change is the Pre-pubertal stage which occurs in females age eight to eleven and is characterized by a light, flute-like vocal tone. Female voices in this stage of development are able to switch between their upper and lower registers with an ease not visible in the other stages of development. “It is much like the male voice at the same age except the female voice is lighter in weight because the volume potential is generally not as great” (Collins, p 140).

The second stage of development is divided into two sections: the Pubescent/Pre-Menorrhoeal stage and the Puberty/Post-Menorrhoeal stage. The Pubescent/Pre-Menorrhoeal stage occurs between ages eleven and thirteen and ends with the onset of the first period or menarche. Indicators of the beginning of this stage coincide with indicators of the beginning of puberty; breast development, height increase, pubic hair, and so forth. This stage is characterized by breathiness in the tone and a greater difficulty in singing in the lower register. Females in this stage experience a vocal break or “chink” around the range of G4 to B5 [Middle C is notated as C4 for this paper and all other notes are identified in relation to C4] and may also feel some discomfort in singing. Some girls may have difficulty producing a chest voice during this stage. Symptomatic signs include difficulty or discomfort with singing, difficulty achieving volume (especially in the middle and upper range), breathy tone throughout the upper range (head voice), and a fuller tone in the lower range (chest voice) with an obvious flip into a breathy,

childlike, flutelike voice at the transition from lower to upper registers (Collins, p 140).

The Puberty/Post-Menorrheal stage begins with the onset of menstruation (menarche) and is characterized by a huskier and heavier voice quality, allowing the lower notes of the register to be most easily produced. According to Gackle, this is the peak of the mutation and is a very critical point in female vocal development, as well as physical development. This stage is the most critical because the tessitura (comfortable range of singing; the part of the range in which the voice performs best in sound and ease) is shortened and can move up or down depending on the changes in development, which are unpredictable and sporadic. At times the tessitura can narrow at either end leaving the student with a five to six note range of comfortable singing. Register breaks occur between G4-B5 and also at D5-F sharp5. Singing may be more comfortable in the lower range due to the sporadic shifting; however “singing only in the lower range for an indefinite period of time can be injurious to the young unsettled voice because of a tendency to overuse the chest voice” (Collins, p 141). Indicators of this stage are “hoarseness without upper respiratory infection, voice cracking, difficulty or discomfort with singing and lack of clarity in tone” (Collins, p 141).

The last stage of female adolescent vocal development is the Post-Menorrheal/ Young Adult stage. This stage usually begins around age fourteen to sixteen and is characterized by an overall increase in vocal

capability. Consistency is greater in moving between the registers and “the voice break (passaggio) is more apparent at D5-F sharp5, which is more typical of adult voices” (Collins, p 141). Generally an increase in breathiness and development of a fuller and richer tone occurs, but still does not sound like a female adult. Singing usually occurs with a greater ease allowing the female to produce a controlled vibrato, as well as an increase in volume, resonance, and vocal agility.

**Figure 1- Stages of Development**

<p><b><i>Stage I:</i></b> <i>Pre-pubertal</i> <i>(Ages 8-10 or 11)</i></p>	<p><b><i>Stage IIA:</i></b> <i>Pubescence/</i> <i>Pre-menarcheal</i> <i>(Ages 11-12 or 13)</i></p>	<p><b><i>Stage IIB:</i></b> <i>Puberty/</i> <i>Post-Menarcheal</i> <i>(Ages 13-14 or 15)</i></p>	<p><b><i>Stage III:</i></b> <i>Young adult</i> <i>female/Post-</i> <i>menarcheal</i> <i>(Ages 14-15 or 16)</i></p>
<ul style="list-style-type: none"> <li>• Light, flutelike</li> <li>• No apparent register breaks</li> <li>• Flexible</li> </ul>	<ul style="list-style-type: none"> <li>• Breathiness in tone</li> <li>• Difficulty achieving volume</li> <li>• Singing becomes difficult at times</li> <li>• Voice becomes “weightier” and it is more difficult to move with flexibility</li> </ul>	<ul style="list-style-type: none"> <li>• Voice cracking</li> <li>• Some breathiness and lack of tone clarity in tone</li> <li>• Hoarseness without infection.</li> <li>• Singing is difficult (especially in the upper register)</li> </ul>	<ul style="list-style-type: none"> <li>• Overall pitch and volume range capabilities increase</li> <li>• Breathiness begins to decrease</li> <li>• Vibrato appears</li> <li>• Vocal agility increases</li> </ul>

### **Adolescent Female Voices:**

#### **Ranges and Tessituras**

In an article published in the March 1991 *Choral Journal*, Lynn Gackle offered, in addition to the stages of development, a list of indications of female vocal changes to help educators become aware of possible critical periods of the voice even though the process and results may not be as dramatic as the

male vocal change. For example, she alerts choral directors to be aware of the following indicators of the female vocal changes:

1) insecurity of pitch, 2) development of noticeable register breaks, 3) increased huskiness in the voice, 4) decreased and inconsistent range capabilities, 5) voice cracking, 6) lowering of speaking fundamental frequency, 7) uncomfortable singing or difficulty in phonation, 8) heavy, breathy “rough” tone production and/or colorless breathy thin tone quality, and 9) hoarseness (Gackle, 1991).

Charles Hoffer, *Teaching Music in Secondary School*, is cited as stating the “breathy, thin quality of the adolescent girl’s voice” is the result of many factors including “. . . muscular immaturity, lack of control and coordination of the breathing muscles, and insufficient voice development” (Hoffer, 1983, p 246). Many sources other than Gackle also concur on the influence of menstruation on the female voice.

While there is no definitive scientific medical research to completely confirm this phenomenon, there is evidence corroborating the fact girls are experiencing puberty earlier than their mothers did; at least three to four months earlier each decade. At the same time, teachers have reported these symptoms of voice changes, in elementary schools, instead of solely in middle schools, which has traditionally been the focal point of pubertal changes of adolescence.

As cited in an article by Lynn Gackle in *Bodymind and Voice: Foundations of Voice Education* (June 2000), Tanner (1972) and Marshall and Tanner (1969) in their research on female development have made the following observations:

The age at which these changes begin, however, has been highly variable among girls in the United Kingdom and now occurs earlier than previously recorded. . . in the early 1930s the average age of British female menarche was 14 years. In the early 1970s, average menarche occurred shortly before the thirteenth birthday. Menarcheal age appeared to be occurring three to four months earlier per decade. Earlier maturations were attributed to changes in nutrition [for example, higher caloric intake particularly from proteins during infancy] and warmer climates.

To deal with the multitude of changes in the adolescent voice, Gackle and others recommend constantly testing and retesting the ranges of adolescent girls. This will allow teachers to discern potential pitfalls and hindrances to the student's vocal progress. If necessary, the teacher may need to move the student to a variety of different voice parts throughout the school year. Gackle recommends dividing the female sections of the choir into light soprano and rich soprano instead of the traditional alto and soprano. She believes it is not possible for the female adolescent voice to truly be alto in the adult definition of the term. This label of "alto" denotes a lower vocal range

and voice type, which might serve to hinder students' later vocal development because they believe they are a certain "type" of voice. She advocates treating the sections as equal voices by:

- 1) Vocalizing all girls through the full compass of the voice
- 2) Choosing music that has equal voice parts
- 3) Switching parts in regular scores so that students have the opportunity to sing the two or three parts written for female voices, as long as the ranges are comfortable (Collins, p 141).

Bonnie-Blu Williams (1990, p 161) found that post-menarcheal females began to show preferences for singing high or low tones in her study on the effects of menarche in the female voice change. Researchers Ingram and Rice found while not all females will go through extremes of the vocal change, most that do, experience strain, loss of high register and heavy/rough tone quality. They recommend encouraging female students to develop correct vocal technique in posture and breathing during the stages of development in which the student experiences strain. Ingram and Rice suggest students who are experiencing difficulty singing should refrain from forcing or over-singing during this time (Ingram & Rice, 1962). Barbara Doscher maintains,

The single most important trait of the young voice is its limited endurance . . . Very soft or very loud singing, except for a limited time is not advised. The tessitura must be carefully monitored . . . singing

for too long a time is especially dangerous. Always exercise over caution rather than under caution (Doscher, p 241).

### **Classification of Voices as Soprano or Alto**

A controversial issue which has arisen among choral teachers is the classification of adolescent girls as either soprano or alto, while their voices are still in development. Leon Thurman states in his article on voice classification:

Once a singer's voice is "classified," the singer "becomes" one of those labels, often for life. It is part of the singer's personal self-identification or self-image. Pitch range limitations are often placed on people because of their voice classifications. [For example, altos and basses cannot sing high notes] (Thurman, 1988).

Thurman believes, based on these results of classifying a certain voice type, both choral and voice teachers should examine the way a student's voice is classified. First, all vocal classifications are based on the vocal range, believing "higher singing pitch range ability indicates soprano and tenor; lower pitch range ability indicates alto and bass." In addition to the actual singing range of the student, many teachers take into account the speaking range as an indicator of voice classification, also drawing on the earlier rule of higher pitches indicating sopranos and tenors and lower pitches indicating altos and basses. Other factors include the pitches at which the vocal register transitions, vocal quality [rich and dark or light and bright], as well as the

students own ability to maintain a harmony part and read music against others singing a different melody line.

Thurman recommends voice classification guidelines as a necessary and very important part of working with adolescent voices. Why are they important? Thurman states, "When classifying a changing adolescent voice, we hold the fragile vocal future of a human being in our hands" (Thurman, 1988). He believes the adolescent voice goes through predictable vocal changes and vocal classifications guidelines should change with them, because when adolescent voices are assigned vocal parts which exceed their ability at the time, they will sing with excessive effort and jeopardize their vocal health.

William Vennard states:

A good many teachers are so pleased with the fresh lightness of a young girl's talent and yield so readily to the temptation to work on repertoire instead of building the voice, that they try to make coloraturas out of all their feminine students. If the girl happens to be a potential contralto, it will be discovered only if she also happens to be completely unashamed of her chest voice. Meanwhile, she may strain her voice working for high notes that are not hers. The only girls who really benefit by cultivating the falsetto exclusively are the true coloraturas, who are rare (Vennard, 1967, p 78, s.277).

Vennard believes that teachers should not feel a sense of urgency to classify a female student's voice. Also, he believes that the teacher should take into



account a student's tessitura in addition to, and perhaps more importantly than, a student's total range (Vennard, p 79 s.282). In *The Functional Unity of the Singing Voice-Second Edition*, Barbara Doscher goes one step farther by stating the range of the student to be "the least reliable and most dangerous way to classify a voice" (Doscher, 1994, p 196).

Other than indicating whether a voice is male or female, a relatively simple judgment to make about normal voices, range is a "sometime-thing." Particularly in young voices, it can bob up and down like a yo-yo. A mezzo-soprano range is common for a young soprano who has not yet found the light or head voice. . . A conclusive range is almost always a product of vocal maturity and, as such, is of little use as a tool to classify voices during training (Doscher, p 196).

Instead, Doscher suggests that the "tessitura and careful monitoring of the bridges between registers" is the best way to classify a young female voice (Doscher, p 197). Skoog and Neiderbach agree with Vennard and Doscher stating their belief that classification of the voice is an "ongoing process, since the real voice does not emerge until the singer is taught to use the whole voice properly" (Skoog and Niederbach, 1983).

### **Vocal Registers**

In addition to understanding the classification limitations of the voice, a teacher needs to also be able to understand the basic phonation of the voice, especially the divisions of the voice into registers (Vennard, 1967). The female

voice has been typically divided into three registers by vocal experts: chest, middle, and head, with an auxiliary register called whistle or flute (Doscher, p 178). The “breaks” between these registers can be described as:

. . . an increase in pressure and airflow as the pitch rises until the highest frequency of a given register is reached. At this point, especially in the early stages of training, the mechanism shifts to a lower pressure-air flow ratio. Many choral musicians call this phenomenon the “lift of the breath,” which is certainly descriptive of what is probably a decrease in acoustical loading on the vocal folds (Doscher, p 175).

Barbara Doscher quotes Mathilde Marchesi (1821-1913), one of the most successful teachers of female singers in the history of vocal pedagogy, in addition to doing considerable work on developing a model of the female registers. Marchesi holds the chest register to be when the vocal folds are full and broad and the highest note to be sung in this register should be between E4 and F#4. Vennard states, concerning the female chest register that, “. . . forcing the female chest voice upwards is dangerous if not malpractice” (Vennard, p 76, s.266) thereby lending further expert evidence to the idea that using the female chest voice in this way could cause just as much damage as a heavy glottal attack (Doscher, p 178).

Doscher states that as the pitch rises “the opposition of the cricothyroid to the vocalis increases, the cords begin to elongate and tense, and

only the edges of the folds vibrate on an almost parallel course” (Doscher, p 179). In order to blend the chest register and the middle register, an understanding of breath control is necessary to prevent a return of the chest register. Breath control is an integral element in blending each of the registers together because ultimately singing should be done with a mix of the registers. The middle voice is where the singer will feel most comfortable singing and yet, “this register is an important problem area in the training of female singers” (Doscher, p 173). William Earl Brown, author of *Vocal Wisdom*, uses the following analogy to describe the importance of developing the middle voice. Brown states: “You do not water a tree at the top, but at the roots—and the tree spreads and blooms as a natural consequence. It is the proper training of the middle voice that brings the beautiful head voice” (Brown, 1931, p 137). Doscher believes this middle register to be the “area of prime importance,” because only after a female singer learns to manipulate this part of her range can she really begin to develop her voice.

The head voice is often the most distinguished register of the voice. The result of a pure head voice is a “light soaring sound with minimal overtones” where the epiglottis is fully raised. According to Doscher’s research, at the time a head register is in use, the vocal folds adduct more firmly causing their amplitude to increase, and in turn breath support must deepen. Doscher describes what the anatomy of the head register looks like and the result of this arrangement, saying:

The larynx stays comfortably low and the ventricular cavities (located just above the true vocal folds) widen. The result is the full “hooked-up” head voice and a sound wave rich in upper partials (Doscher, p 180).

According to many vocal pedagogues, the head voice, when used correctly, allows a singer to sing for a longer and more intense amount of time. It is also in this register where the need for vowel modification becomes apparent. Vowel modification will depend on each individual singer’s vocal weight. This head voice is often underused and in turn underdeveloped because much modern music is written in the lower ranges of the middle register. In conjunction with the head voice, the whistle/ flute register is an extremely high register that is “a laryngeal whistle that does not seem to be produced by the vocal folds but by the whistling escaped air between them.” While this register cannot produce any extremely loud dynamic level, “projection is excellent because of the very high frequencies” (Doscher, p 183). William Zemlin, *Speech and Hearing*, describes this register as: “. . . a laryngeal whistle which does not seem to be produced by the vibration of the vocal folds but by the whistling escape of air between them” (Zemlin, 1988, p 166) Examples of this whistle register or whistle tone can be heard in the music of the pop singer Mariah Carey, popular song stylist (McKinney, p 106). This whistle register is “the highest phonational register” and is produced by “the passage of air through a triangular opening between the arytenoid cartilages”

(McKinney, p 106). McKinney states that more research needs to be done on the use and abuse of this vocal register, because it is one of the least explored registers of the voice (p 106).

When teachers understand the differences in the way the registers sound and are produced, they can best instruct their students in developing proper vocal technique and facilitate vocal health. If a teacher instructs in ignorance of vocal registers, they can and will allow improper techniques and habits to develop, greatly hindering the students' vocal progress. For example, the chest register is often forced to the notes that should be sung in the middle or head registers, developing a poor vocal technique. Doscher comments on this occurrence, saying:

It is a classic example of too much effort being expended on the upper notes of a given register, making it impossible to develop any power on the low notes of the next register. Remedial work is tedious and slow, and there is a long period when the sound is fuzzy in both registers (Doscher, p 182).

A great example of this predicament is a student believing their chest register is the belt range and trying to force notes above the capacity of the chest register, prompting great strain on the vocal cords as well as a long list of consequential vocal health issues. Once a student develops this incorrect technique, it will take an inordinate amount of work and time to correct; time

which could be used by the teacher to further a student's vocal proficiency and skill.

**Figure 2- Vocal Registers**

<b><i>Chest</i></b>	<b><i>Middle</i></b>	<b><i>Head</i></b>	<b><i>Whistle</i></b>
<ul style="list-style-type: none"> <li>• Used often in gospel singing</li> <li>• Can be confused with the belt range</li> <li>• Main use is very low notes not available in the middle register</li> <li>• Excessive use can result in vocal problems</li> </ul>	<ul style="list-style-type: none"> <li>• Normal register for speaking and singing</li> <li>• Transition register from chest to head</li> <li>• Most important range to develop in the female voice</li> </ul>	<ul style="list-style-type: none"> <li>• Sometimes called "falsetto" register</li> <li>• Overlaps with the middle register</li> <li>• Vowel modification becomes necessary in this register</li> <li>• When used correctly, can allow the singer to sing for a sustained period of time</li> </ul>	<ul style="list-style-type: none"> <li>• Sometimes called "flute" register</li> <li>• An auxiliary register to the head register</li> <li>• Highest phonational register (begins around C6 and extends upward almost an octave)</li> <li>• Whistling air escaping through the arytenoid cartilages</li> </ul>

### **Vocal Practices, Exercises, and Procedures**

If teachers are aware of the physical developments and changes occurring within their female adolescent students, they will be better prepared to instruct them and facilitate vocal health. Voice teaching is often somewhat guesswork, because each person has a different instrument with which to work. Each person has a uniquely designed voice and must be instructed in a unique way. Yet, there are many common factors in the development of each voice and teachers/choral directors must be aware of them in order to educate their students and help the students allow the full potential of their individual vocal capacity to be reached. In fact, many of the problems which occur as the

voice matures are as a result of the misinformation of a teacher, which then requires much time and effort to remedy.

While the students are unable to produce a strong, clear tone due to the voice change, teachers should focus on other exercises that instruct in good vocal production technique, such as posture, breath support, staccato and legato singing, placement of the larynx, etc. In *Teaching Choral Music-Second Edition* (1999), Don L. Collins lists multiple exercises that have been developed to train singers to produce a healthy, clear, and relaxed tone. This approach is “a specific proven technique of proper tone productions for younger and older adolescents” and is a simple and clearly structured procedure, starting with posture and breath control, which builds and reinforces each level. Kenneth Siple, *The Adolescent Female Voice: A Review of Related Literature* (p 23), developed the following organization of instruction for developing good vocal technique. Each level cannot be mastered without sufficient demonstration of the previous level.

- 1) **Posture**- forms the basis for all vocal develop; a student must learn to hold his/her instrument correctly before he/she can sing in a healthy manner
- 2) **Breath Management**-the motor of the singing mechanism; the process by which air is used most effectively for the sustained sound needed for singing

- 3) **Relaxation**- there must be a feeling of relaxation in those muscles which may impede correct singing; the majority of voice problems are the result of exaggerated muscle activity
- 4) **Phonation**-only when muscles in the singing mechanism are free to function properly [without tension] can accurate and natural phonation occur; no conscious feeling of the vocal folds coming together in phonation
- 5) **Resonance**- one of the most serious mistakes a singer can make is to substitute volume for resonance; humming is a great exercise for achieving a balance in the resonators
- 6) **Registration**- train the student to sing in a way that the audience cannot tell in which register the tone is being produce; a blending of the registers
- 7) **Articulations**- correct vowels separated by strong, but not interfering consonants

One complaint of choral teachers with a large percentage of female students in the middle of the voice change, for example, is that the director may have a large female choir, but the volume level is very low. Several exercises developed by Emily Crocker in *Warm-Ups and Workouts for the Developing Voice* (available through Hal Leonard Publishing), are very effective in helping the student to develop a more resonant tone as she encounters Stage II A & B, and transitions into a more adult voice. Students



must be coached and guided in order to remove the breathiness, which is inevitable in Stage II, from the tone as they reach the end of the voice change. One way of dealing with the adolescent female voice is to change the concept of tone from “loud and full” to an accepted “soft and pure” (Phillips, 1996, p 83). “Junior high girls do not have to sing forever in a state of breathiness if they are taught to sing correctly!” (Phillips, p 47) Emphasis on good vocal technique and realignment of the voice will encourage young women to improve their singing and to understand the new sound as a temporary condition.

Another important responsibility of a choral director with female changing voices in his/her choir is choosing literature. As noted in the earlier section on the stages of development, as well as ranges and tessitura, the vocal range of an adolescent female is a fragile and often uncertain instrument. A teacher must pay attention to the tessitura [*the range in which the majority of the notes of a piece lie*] of a piece to make certain it does not lie in a range that is too high or too low for a changing voice. Extremely soft or loud dynamic levels can also be detrimental to the female adolescent voice. Anthony Barressi and Teresa Pamela Russell suggested several criteria for selecting appropriate literature for the adolescent singers at a symposium on the male adolescent changing voice (Barressi and Russell, p 168-172, 1984). Though the criteria were given in relation to the male changing voice, many of

the suggestions listed in the chart below are applicable to the female changing voice as well.

**Figure 3 – Literature Criterion**

<i>Melodic Contour</i>	Choral parts written for areas of the voice where rapid register changes are required should be avoided since the minute vocal adjustments necessary for the successful negotiation of such passages are beyond the technical abilities of most adolescent singers.
<i>Tempo and Rhythm</i>	Adolescent girls, because they are experiencing less dramatic effects of vocal change [than boys], are capable of performing parts in swift tempos.
<i>Dynamic Markings</i>	For most adolescents, <i>ff</i> and <i>pp</i> are difficult to perform tunefully and with a pleasant tone quality, particularly in the extremes of the vocal range. Directors should work for <i>mf</i> and <i>p</i> in the comfortable areas of the students' voices for successful and pleasant singing.
<i>Text</i>	Text should be age appropriate and topics to which the students can relate. Choral directors will have much more success with textual subject matter that is noble, heroic, religious, or humorous in nature.
<i>Stages of Change</i>	For choruses containing singers in all the change stages (8 <sup>th</sup> and 9 <sup>th</sup> grades), three and sometimes four part music will meet the needs more adequately than unison or treble voicing.
<i>Other Voicing</i>	Be careful with Soprano, Alto (SA); Soprano 1, Soprano 2, Alto (SSA) . . . because they may need to be edited to be functional.

### **Conclusion**

A teacher of music has a great and serious responsibility to the vocal health and development of his/her students as they traverse through the physiological changes of adolescence. The time in which physiological changes occur during vocal development, is one of the most fragile points in a

young woman's life. If her vocal instrument is misguided and/or mislabeled due to ignorance on the part of the teacher, a talent could be lost, wasted, damaged, or at the very least its potential will only be partially realized. Each educator must take the time to educate him/herself in the current research available on the changing female adolescent voice. A music teacher must not only teach notes and rhythms, but also instruct his/her students in vocal technique and health in order to ensure these students have their own unique, enduring instruments.

Choral training has been oriented toward "creating a sound" rather than building expressive voices. The "creating" tends to be "in our own (adult) image," rather than to helping young people find their own, unique, personal, age-appropriate, "image" that reflects who they are in the present moment (Gackle, 1991).

More than just teachers of notes and rhythms, we have the opportunity to be teachers of music, not only to impart basic knowledge but also to direct students in a lifelong musical future of performance and self-expression.

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