

# Research on Breathing Techniques in Wind Instrument Performance and Phased Teaching Approaches

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**Abstract:** Breathing, as the fundamental technique of wind instrument playing, is very important for the tone quality, pitch constancy, and musical phrase expression by using correct breath control and management. In soft passages, a continuous, focused, and supportive airflow is needed, whereas in forte parts, the airflow speed should be precisely regulated. The breathing technique in wind performance mainly depends on the combination of adequate inhalation and accurate breath control. During the process of wind performance practice development, three traditional breathing methods — chest breathing, abdominal breathing, and thoracoabdominal breathing — have been formed, each having different physiological mechanisms and technical characteristics and suitable for various performance situations. This paper comprehensively studies the merits, drawbacks, and applicable scopes of these three breathing methods; reviews the historical evolution of breathing techniques in wind performance at home and abroad; investigates the scientific principles for controlling the airflow effectively and achieving smooth breathing changes; and, from the viewpoint of music teaching, proposes step-by-step teaching methods for the breathing techniques. The purpose of the research is to improve the theoretical foundation of breathing in wind performance, offer theoretical references and practical advice for wind education and performing practice, and thus promote the advancement of wind art academically and practically in China.

**Keywords:** Wind instrument performance; Breathing methods; Breath control; Breathing techniques; Music education

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## 1. Introduction

Breathing is the main factor in producing sound for wind instruments. The regulation and utilization of breathing and airflow are the basic skills of wind players, and the significance of these skills in performance practice cannot be overestimated <sup>[1]</sup>. Different from the performing techniques of string instruments or the

piano, the breathing in wind playing is an inner technical process that cannot be directly seen or sensed. Hence, it is necessary to master the scientific breathing methods and form a method suitable for one's own physical condition in order to enhance the technical ability in wind performance.

According to previous studies, there are three kinds of breathing methods used in wind instrument playing: chest breathing, abdominal breathing, and thoracoabdominal breathing. Some researchers and performers select one of these methods only, without considering the advantages, disadvantages, and different usages of each method <sup>[2]</sup>. Although the physiological mechanisms of breathing in wind playing and singing are similar, there are some differences in practice because of the different sound-producing materials. Abdominal breathing is generally applied in vocal music, while thoracoabdominal breathing is now commonly used in wind instrument playing <sup>[3]</sup>. At present, many wind players and learners still have wrong ideas about the breathing methods, which prevents them from fully understanding the importance of the breathing techniques in the performance.

At the same time, wind schools in various countries show slight variations in their ways of using breath, which are now significant factors in forming performance styles. Besides, there are differences between Chinese and foreign traditions in terms of the importance given to breathing exercises and their practical applications <sup>[4]</sup>. On the basis of the previous studies, this paper objectively investigates the physiological mechanisms and technical features of the three breathing methods, elucidates the scientific basis of breath control and breathing changes, and traces the historical evolution of breathing techniques in wind performance both in China and abroad. From the viewpoint of music education, it also suggests specific teaching methods, with the purpose of improving the knowledge about breathing techniques in wind performance and offering scientific advice for wind education and performance practice.

## **2. Physiological mechanisms and technical analysis of the three classical breathing methods in wind instrument performance**

The three breathing techniques in wind performance have distinct physiological mechanisms and technical features, which mainly affect their use and efficiency in performance. Only by clearly recognizing the main characteristics, benefits, and disadvantages of each technique can the performers make scientific choices and apply them flexibly <sup>[5]</sup>.

### **2.1. Chest breathing**

Chest breathing is a kind of shallow breathing that makes the chest cavity expand in three dimensions—front, back, and sides. The physiological movement mainly occurs in the middle of the thorax. When inhaling, the external intercostal muscles cause the chest cavity to expand, the shoulders to raise, and the chest to contract, directing the air flow to the upper part of the lungs. This is the usual rapid breathing manner of the human body after strenuous exercise <sup>[6]</sup>.

From a technical viewpoint, the only benefit of chest breathing is its fast inhalation response, enabling the person to inhale air in a very short time, which is appropriate for replenishing breath quickly in emergency situations. However, its disadvantages are considerable and generally inconsistent with the technical requirements for wind performance.

Restricted respiratory capability — it mainly utilizes only the upper portion of the lungs, which is not adequate for long sentences or loud passages.

Insufficient breath control leads to muscle tension in respiration, causing unstable exhalation and variation in airflow and volume, which may result in a change of pitch and a weak, poor voice.

High physiological burden — continued use may result in shoulder and neck strain, difficulty in breathing, dizziness, and general body stiffness, which may influence the naturalness of performance.

In a sudden airflow change after inhalation, the variation affects the smoothness of musical phrases.

In the field of wind performance and education, the practical use of chest breathing is very limited. It can only be applied temporarily for rapid double- or triple-tongued passages to provide emergency breath replenishment and is not suitable for systematic training or long-term performances. For novices, chest breathing usually becomes their natural method because of its simplicity and convenience. However, continuous dependence on it may result in the formation of bad technical habits, limit the improvement of breath control, and obstruct the progress of performance skills. Therefore, in teaching, it is important to correct this tendency at an early stage and instruct the students to adopt scientific breathing methods <sup>[7]</sup>.

## **2.2. Abdominal breathing**

Abdominal breathing, also known as diaphragmatic breathing, is a method of deep breathing in which the diaphragm is compressed, resulting in the movement of the abdomen during inhalation and exhalation. The principle of this method is that the diaphragm and abdominal muscles work together in respiration: when inhaling, the diaphragm contracts and moves downward, the abdomen expands naturally, and the lower lungs are expanded to take in deep air; when exhaling, the diaphragm relaxes and returns to its original position, and the abdomen contracts inwardly due to the action of abdominal muscles to discharge air gradually.

The technical advantages of abdominal breathing lie in the precision of breath control:

Effortless and quick inhalation enables short inhalation times, which are appropriate for rapid breath replenishment in short-to-medium length phrases.

Direct and accurate control by using abdominal muscles — the performers can change the speed and quantity of air flow, which is advantageous for playing soft parts gracefully <sup>[8]</sup>.

The chest and shoulders should be relaxed during respiration, which is beneficial in relaxing the muscles, decreasing the heart rate, and maintaining an upright posture. Moreover, abdominal breathing can significantly enhance lung capacity, giving useful practice for strengthening the basic respiratory capability of a performer.

However, abdominal breathing has some technical drawbacks in wind performance, thereby preventing it from being the dominant method:

Inadequate air intake volume — the thoracic cavity is hardly involved, and lung expansion is restricted, which cannot satisfy the breathing requirements for brass instruments, large woodwinds, or prolonged, continuous phrases.

Single muscle group involvement — depending only on the diaphragm and abdominal muscles, continuous use may cause exhaustion of the abdominal muscles, and, under inadequate ventilation, hypoxia might occur.

Limitations in tone production — the breath support point is relatively low and does not connect closely with the instrument's sound-producing area, which can result in a tone that is overly heavy, lacking in fluidity, and brightness.

At present, abdominal breathing has virtually no independent application in professional wind

performance. Only a few players of small woodwinds, such as the piccolo or Eb clarinet, may moderately incorporate their breath-control characteristics in soft or delicate passages. In wind education, abdominal breathing can serve as a foundational training method for breath control, helping learners develop a core understanding of “diaphragmatic support” and laying the groundwork for later mastery of thoracoabdominal breathing<sup>[9]</sup>.

## **2.3. Thoracoabdominal breathing**

Thoracoabdominal breathing is a composite method that integrates the physiological mechanisms of chest and abdominal breathing. It was clearly proposed by the renowned vocal pedagogue M. Garcia. Due to its scientific physiological basis and comprehensive technical features, it has become the mainstream method in wind performance, highly regarded by the vast majority of professional performers and educators.

### **2.3.1. Physiological mechanism of movement**

Thoracoabdominal breathing can make the whole respiratory muscle work in harmony and is the most scientifically based breathing method in sports. When inhaling, the external intercostal muscles become active to expand the chest in all directions, and the diaphragm also contracts and moves downward, making the abdomen protrude. The ribs spread completely, and both upper and lower parts of the lungs are stretched to the fullest, thus increasing the lung capacity and enabling the entry of enough air. During exhalation, the abdominal muscles contract slowly to allow the diaphragm to rise naturally, and the chest cavity contracts due to its own elasticity and the coordinated action of the thoracic and intercostal muscles. By the opposite contraction of the chest and abdominal muscles, a steady and controlled airflow is kept.

### **2.3.2. Core technical features**

Thoracoabdominal breathing combines the benefits of chest and abdominal breathing without its technical drawbacks, possessing four main features:

Strong breathing capacity — the simultaneous expansion of the chest and abdomen facilitates the full use of lungs, offering enough breath support for long sentences and forte parts, and satisfying the various respiratory requirements of wind performances.

Effective lung capacity: the contraction of chest and abdominal muscles forms a flexible and adjustable “breath supporting mechanism”, which can control the speed and volume of air flow accurately and enables smooth transitions between gentle and loud parts to satisfy the tone and expressive requirements of different musical sections.

Muscle endurance refers to an even distribution of breathing load on the diaphragm, abdominal muscles, chest muscles, and thoracic-back muscles, preventing overfatigue of any single muscle group and enabling the performers to keep a stable breathing throughout long performances or practices.

Natural body posture — the chest and shoulders are kept relaxed during breathing, with coordinated movements only in the chest and abdomen, which helps to decrease muscle tension and improve the performer’s posture and musical expression.

### **2.3.3. Performance and educational application value**

Thoracoabdominal breathing is the most appropriate method for respiration in wind playing, applicable to all kinds of wind instruments (woodwinds and brass) and various performance situations. For brass instruments,

it can supply enough air for loud parts and long phrases, while providing accurate breath control to maintain the pitch and tone steady. For woodwinds, it can control the airflow precisely to produce clear and bright tones, thus achieving fine expressions in soft parts.

In the study of wind education, thoracoabdominal breathing is an important part of training, and the mastery of this technique is a necessary condition for improving performance skills. The training of thoracoabdominal breathing not only helps in acquiring scientific breathing methods but also improves the coordination of respiratory muscles, establishes a right view on the use of breath, and provides a strong technical basis for the progress of performance skills and musical expression.

### **3. Scientific principles for the application of breath control and breathing techniques in wind instrument performance**

Mastery of scientific breathing methods is required for playing wind instruments. Correct utilization of breath control and breathing techniques, to harmonize respiration with the musical rhythm, can enhance artistic expression. The breath used in wind performances does not have a fixed shape; it should be modified according to the piece, playing abilities, and expressive needs. Moreover, the breathing must obey the musical structural rules in order to avoid disruption of the sequence and continuity of musical sections.<sup>[10]</sup>

#### **3.1. Core principles of breath control**

Breath is the main factor in producing sounds for wind instruments. The pitch, strength, and tone are all influenced by the regulation of air velocity and amount. Most mistakes in performance, such as incorrect intonation, poor tone quality, or interrupted musical phrases, are caused by the inappropriate use of breath. In order to reach a harmonious relationship between technical skill and musical expression, breath control in wind performances should obey three basic rules.

First, a slow inhalation and exhalation serve as the basis; a rapid one is used as an addition. Slow breathing is important for the primary training of breath control. When inhaling, the chest and abdomen must expand gradually to obtain enough and deep air. During exhaling, the breath should be released slowly under the control of the respiratory muscle groups, keeping the air speed and volume even. This rule can improve the breath control ability and develop a steady breath support. However, only when performing such fast passages as double tonguing, triple tonguing, or fast scales, the speed of inhalation and exhalation can be slightly increased, but the breath control must be maintained to accomplish quick air replenishment and sound production. In this case, rapid breathing does not indicate disordered and hurried inhalation; instead, it means to breathe in sufficiently and deeply within one beat.

Furthermore, one should control the breathing according to the requirements of the music, adjusting it in accordance with the characteristics of the different parts of the music. The short and soft passages need a slower airflow and a smaller air volume to produce a soft and delicate sound. While the long legato melodies need a steady airflow and an equal air volume to keep the phrase continuous. In the sharp and urgent passages, a moderate increase in the airflow and accurate regulation of the air volume are necessary to guarantee the clearness and strength of the articulation. For the lyrical and song-like passages with changing pitches and dynamics, the airflow should be adjusted dynamically to form a layered and expressive line.

Furthermore, keep some residual air to ensure continuous support. During expiration, a certain quantity of air should be kept in the lungs; the breath must not be fully exhausted. If the remaining air is enough

to play for one or two beats, inhalation should be prepared. The residual air is beneficial to keep the lung expanded and the respiratory system's muscular tension, avoiding the relaxation of muscles due to the complete exhaustion of breath. This guarantees the continuity of the next inhalation and sound production, thereby preventing breathlessness and maintaining the overall stability of performance.

### **3.2. Scientific principles for the effective application of breathing techniques**

Breathing renewal is an important part of the respiratory process in playing wind instruments, and its suitability has a direct influence on the smoothness of musical phrases and the completeness of musical expression. The main rule for breathing renewal is that respiration should support the musical framework. Therefore, breathing points should be arranged before sight-reading, and proper breathing techniques should be chosen according to the structural features of the piece and performance requirements, avoiding incorrect ideas and mistakes in breathing.

#### **3.2.1. Precisely plan breathing points, giving priority to the musical structure**

When performing music and reading it, the positions for breathing should be chosen beforehand. One must take into account the ends of the sentences, the termination of the parts, or the natural pauses in the musical structure (usually marked as “V” or a comma in the score for breathing positions). The breath should be inhaled at these spots without altering the sentence or the musical line. It is not permitted to breathe abruptly in the middle of a whole sentence; it might interrupt the musical continuity and convey an incorrect impression <sup>[11]</sup>.

In the situation that there are no intervals between the phrases or when a phrase is too long without a proper stop, a fast breathing method can be applied to finish it. According to the rules of music, the duration of the previous note may be reduced slightly to produce a short interval for quick and deep breathing. The inhalation should be silent in order to maintain the regularity of the rhythm and the flow of the music. The main purpose of this method is to restore the air without interfering with the musical expression.

#### **3.2.2. Targeted control of breathing techniques for special note patterns**

During the performance of the consecutive off-beat (second part of the beat) patterns, the breath should be taken after the end of the phrase, because it is not permitted to breathe after each pause or to inhale before each note. Otherwise, the rhythm and the whole melody would be disturbed. Besides, when playing fast and continuous scale-like sections, the breath should be kept at the points where the ascending and descending notes meet. These points are appropriate for melody variations, allowing the performer to take a breath without affecting the melody.

#### **3.2.3. Avoid common mistakes in breathing techniques**

Errors in breathing during playing wind instruments generally occur in three ways, which both affect the performance results and need to be paid attention to in the practice: Firstly, unexpected breathing happens when the player stops to breathe according to his own air supply instead of following the musical structure, thus disturbing the connection of the phrases and the harmony of the melody. Secondly, the improper use of the rapid inhalation technique. If there are no natural pauses in the passages, the players may either force a breath, which influences the rhythm, or hold their breath while playing, causing body stiffness and poor tone quality. Lastly, not retaining enough air. Taking a deep breath before exhaling quickly may result in a

gap between the breaths and an unstable subsequent rhythm. Moreover, breathing to the greatest capacity can also be disadvantageous, as it is hard to control the breath and gives a tense feeling. This is especially inconvenient in short phrases, where it might produce a stiff tone, opposite to the principle of playing naturally and freely.

## **4. An overview of the development of breathing techniques in wind instrument performance in China and the West**

The alteration of breathing techniques in wind instrument playing has changed from practical knowledge to scientific study, and from personal experiences to general methods. The advancement of Chinese wind instrument breathing skills shows, in a brief way, the development of Western wind performances, and at the same time, combines the local musical culture to form its own unique characteristics. The exchange of cultural and technical relationships between China and other countries has contributed to the continuous improvement of these breathing techniques.

### **4.1. Development stages of breathing techniques in Western wind instrument performance**

The development of breathing techniques in Western wind instrument performance is closely related to the study of respiratory physiology and the progress of wind music. It has gone through three main stages and finally established a scientific system, with thoracoabdominal breathing as the main approach <sup>[12]</sup>.

During the initial stage, prior to the 1960s, the focus in wind playing was on generating a strong sound. Due to the limitations of the existing performance techniques and the degree of physiological research at that time, thoracic breathing was mainly used in the Western wind instruments, particularly in the Eastern European schools such as those in the former Soviet Union and Czechoslovakia. The rapid inhalation of thoracic breathing met the requirements of some fast passages; however, as wind playing progressed, its disadvantages, including inadequate breath support and poor tone continuity, were gradually discovered and restricted the enhancement of performing skills.

Stage Two: Transition to Abdominal Breathing (1970s–1980s). With the progress in respiratory physiology and the combination of various breathing methods, abdominal breathing was incorporated into the Western wind performances, mainly in Western Europe and the United States. It overcame the drawbacks of thoracic breathing by providing a finer and mellower sound. Nevertheless, because of its small inhalation ability, it could not adequately support vigorous brass playing or lengthy phrases and was thus used as an auxiliary technique in both performance and training.

During the third stage (1990s–present), with the development of respiratory physiology and improvement in wind performance techniques, more and more musicians and researchers found that a single breathing method was not sufficient and started to study the combination of thoracic and abdominal methods. Thoracoabdominal breathing, which has been supported by solid physiological principles and possesses many advantageous techniques, has become the main method in western wind performance and is now widely spread and used <sup>[13]</sup>. In the 21st century, as the requirements for breathing techniques in wind performance become higher, different auxiliary training tools such as breath trainers, airflow meters, and lung expansion devices have been invented and applied in the training process. These tools facilitate the quantitative practice of inhalation volume, air velocity, and exhalation steadiness. They are particularly beneficial for beginners and fans, giving them quick guidance and promoting a more scientific and standardized way of training the

breathing techniques for wind instruments <sup>[14]</sup>.

## **4.2. The development of breathing techniques in Chinese wind instrument performance**

The research on breathing methods in Chinese wind instrument performances started after the establishment of the People's Republic of China and has experienced four stages: "Introduction — Absorption — Integration — Innovation." This progress is always associated with cultural contacts between China and other nations, and it integrates the breathing ideas of Chinese traditional wind instruments to establish a theoretical and practical system which combines both international views and local features.

In 1958, the People's Music Publishing House translated and issued "Breathing Methods for Wind Instrument Performance" written by the Soviet wind teacher Zhikov. This book was the first monograph on wind instrument breathing techniques introduced to China. It systematically explained the principles and uses of thoracic breathing and became an important reference for the initial wind instrument teaching in China, making thoracic breathing the main method in early Chinese wind performance.

In the 1970s, domestic investigations on wind instrument playing started in China. A paper written by Mr. Xiang Zhenlong from Sichuan Conservatory of Music, named "Breathing during Wind Instrument Performance", was the first independent research on wind instrument breathing techniques in China, indicating the beginning of a self-study period. In the 1980s, cultural contacts between China and other countries became closer. The China Federation of Literary and Art Circles Publishing House translated and published "The Art of Brass Playing" by the famous American horn player Frank Farkas, which described the physiological principles and breath-regulation methods of abdominal breathing, introducing this technique to China and enhancing the research on wind instrument breathing techniques in the country.

Stage Three: Promotion of Thoracoabdominal Breathing and Research Deepening (1990s–present). Since the 1990s, with extensive cultural contacts in wind music, the western technique of thoracoabdominal breathing has been introduced to China and is now widely used in both performances and teaching. Many research papers concerning wind instrument breathing methods have been published in Chinese music magazines. The research has changed from introducing single methods to a thorough investigation of the physiological basis, technical features, and practical uses, indicating the advancement of breathing technique research in China.

During the twenty-first century, Chinese wind music has combined the Western breathing methods with those of the traditional Chinese wind instruments. The ancient concept of "essence, qi, and spirit" has been applied in the breathing exercises, resulting in a special system of breathing techniques for wind instruments. Moreover, the Western equipment used for breath training has been adopted in the Chinese wind teaching, which is advantageous for the scientific and regular improvement of the breathing training. At present, some domestic investigators and performers are altering the breathing techniques according to the physical state and performance requirements of the local learners, and they are conducting individualized research and practice on the methods of breathing.

## **5. Stage-based teaching strategies for breathing techniques in wind instrument education**

Breathing techniques are important in the training of wind instruments, and the teaching efficiency has a great influence on the basic abilities and future development of the learner. The instruction of breathing techniques

for wind instruments should be carried out according to the physiological condition of the learner and the normal process of skill acquisition. The teaching should be modified according to the main features of three types of learner groups — beginners, intermediates, and advanced ones — by setting up different teaching goals and training methods. This method combines theoretical teaching with practical exercises, so that the learners can gradually acquire a scientific knowledge of breathing and the capability to use it properly.

### **5.1. Beginner stage: Establish scientific understanding and correct instinctive habits**

The initial stage is very important for instructing the breathing techniques of wind instruments. Beginners usually depend on the instinctive thoracic breathing and have no clear knowledge of “breath support.” The main purpose of teaching at this stage is to enable learners to get rid of the usual thoracic breathing habit, acquire a scientific conception of diaphragmatic support, learn the fundamental physiological processes of thoracoabdominal breathing, and establish the correct muscular memory for proper breathing.

In the theoretical teaching, a straightforward and easy-to-understand method should be used, avoiding difficult technical terms. By means of human respiration’s anatomical diagrams, video displays, and other similar aids, the learners can visualize the physiological distinctions between thoracic, abdominal, and thoracoabdominal breathing. Combined with basic exercises for sound production, the learners can recognize the relation between breath, tone quality, and intonation, realizing that breath is the basis of wind instrument sound production. The learners should also be distinctly informed about the restrictions of thoracic breathing and the scientific benefits of thoracoabdominal breathing, which will assist them in forming definite learning aims.

In practical training, attention should be paid to static breathing exercises and simple sound-producing exercises to decrease the difficulty and emphasize the formation of muscular memory:

Do static thoracoabdominal breathing exercises either in a seated or standing posture: Put one hand on the chest and the other on the abdomen to note the synchronous elevation of the chest and abdominal movements during inspiration and the voluntary contraction of abdominal muscles during expiration. Regular practice is advantageous for forming muscle memory.

Slow exhalation exercises with common objects: By blowing on a candle flame or a piece of paper and keeping its steady motion, the learners improve the uniformity of their exhalation and enhance their breath-control abilities.

Simple single-note and short-phrase exercises: Integrating thoracoabdominal breathing with the instrument sound production helps the learners to understand the relation between breath and performance, which is beneficial for the transfer from basic breathing exercises to practical performance.

The main objective at this stage is to immediately correct the bad habits, patiently instruct and lead the learners’ inclination towards thoracic breathing, and avoid the establishment of improper habits, thus laying a basis for further advanced training.

### **5.2. Intermediate stage: Enhance breath control and integrate performance techniques**

Intermediate learners have learned the fundamental steps of thoracoabdominal breathing and can use this technique in some performances. But their control over the breath is still inadequate, and the combination of breathing with performance methods is relatively poor. The main objective at this stage is to enhance the accuracy and steadiness of the breath control, understand the scientific rules for using breath control and renewing breath, and accomplish a thorough integration of breathing techniques with performance skills and

musical expression.

In the theoretical instruction, the content should be intensified and related more closely to actual performances: explaining clearly the three main principles of breath control, i.e., slow inhalation and exhalation, regulating breath as required and keeping residual air, and describing how to adjust breath control according to the requirements of various kinds of passages like legato, articulated, soft, or strong playing. A comprehensive explanation of the scientific rules for breath renewal should also be given, including the arrangement of breathing points, the application of rapid inhalation methods, and strategies for breathing in specific note patterns. Taking scores from typical wind instrument compositions as an example, the breathing points should be marked and analyzed to assist the learners in forming the idea that breath should support the musical structure. Moreover, the differences in using thoracoabdominal breathing between woodwind and brass instruments should be studied to improve the precision and relevance of the instruction.

In practical training, the emphasis should be on targeted breath-control exercises and breathing-renewal techniques, combined with the performance skills for thorough training:

Differentiated exercises of air-speed and air-volume: Adjust passages with slow, moderate, and fast rhythms, enabling the learners to regulate air speed and volume, thus improving their dynamic breath-control ability.

Specialized training on rapid inhalation methods: By performing exercises like continuous phrases with no natural pauses or fast scales, the learners improve their ability to make quick and deep inhalations in brief intervals.

Specialized training about controlling breath to achieve accurate musical beats: Concentrate on challenging rhythms such as off-beat notes and quick tongue movements, and provide specific guidance on breathing methods and techniques.

“Breath-Performance” coordination exercises: Through the practice of some moderate difficulty passages from well-known wind compositions, students enhance their abilities in arranging breathing moments and regulating breath, thereby achieving the simultaneous improvement of technical skill and practical application.

The current main purpose is to offer personal guidance. Based on the learner’s physical condition (such as lung capacity and muscle coordination) and technical shortcomings, suitable training plans are formulated to help the learner learn a breathing control method according to his/her own needs.

### **5.3. Advanced stage: Artistic application and integration with musical expression**

Advanced learners have already acquired proficient breath-control and breathing-renewal abilities and can use thoracoabdominal breathing in their routine performances. The main object of instruction at this level is to make the breathing techniques artistic, so that the breath can express the music. They should change their breathing and air-control methods according to the style and character of the work as well as their own performance style, finally forming a personal and expressive way of performance.

In the theoretical teaching, the emphasis should be raised to a higher level, incorporating musical beauty:

Explore the connection between breathing methods and musical expression thoroughly, examining how breathing methods are used in compositions of various styles (classical, romantic, modern) to enable learners to recognize the importance of breathing techniques in musical expression.

Compare the different applications of breathing techniques in various domestic and international wind

bands, and discuss the influence of breathing techniques on the development of personal performance styles through the performances of some famous musicians.

Present the latest research results in respiratory physiology and the art of wind instrument performance, enlarging learners' academic views and leading them to independent research and exploration.

In practical training, attention should be paid to the performance of the whole work, highlighting artistic expression:

Performance of complete classic wind works: Instruct learners to study the musical elements, melodic features, and dynamic variations in detail, and establish individual breathing and breathing-refreshment plans to ensure that the control of breath and techniques fit with the requirements of musical expression.

Improvisation exercises: Permit students to modify their breath control and breathing methods in accordance with the expressive requirements of the moment, enhancing the flexibility of applying breathing techniques.

Integration of various breathing techniques: Suggest that learners appropriately integrate the technical aspects of thoracic and abdominal breathing during certain parts to attain individualized musical expressions.

Performance evaluation and analysis: By means of recordings or videos, assist the learners to identify the shortcomings in their breathing techniques during performance and constantly improve the coordination between breath and musical expression.

The main objective at this stage is to develop independent research and innovative abilities, instructing students to integrate their physical features, performing style, and the requirements of the music in order to explore new applications of breathing techniques, where breath control is considered an important way to form their individual performance style.

## 6. Conclusion

Breathing is necessary for playing wind instruments. The proper application of breathing techniques has a considerable effect on the tone quality, the correctness of the pitch, the richness of the tone color, and the precise control of the dynamics. It also affects the formation of musical phrases, the curve of melody lines, and the complete expression and artistic result. Using the wrong breathing methods not only decreases the performance quality but might bring about physical inconvenience, like lung fatigue and muscle aches. Hence, the breathing technique is an important criterion for assessing the ability of a wind player and an indispensable component in both wind playing and instruction.

In the performance of wind instruments, the three kinds of breathing methods—chest breathing, abdominal breathing, and thoracoabdominal breathing—have different physiological processes and technical features. Chest breathing enables quick inhalation but is only applicable for emergency breaths and has a small range of use. Abdominal breathing can give exact control of breath but has a restricted inhalation volume; it is mainly used as a basic training technique for breath control. Thoracoabdominal breathing combines the merits of both, balancing the inhalation capacity and breath control. Therefore, it is considered the most reasonable and ideal breathing method in present wind performance and has been widely chosen in wind playing and teaching both in China and abroad.

Breath control and breathing methods in wind performance should conform to scientific rules and be closely related to the musical framework. Inhalation should be slow and steady, adjusting the flow of air and quantity according to the features of the music, keeping a sufficient reserve of breath at the same time. The

breathing points should be arranged beforehand and mainly correspond to the musical structure. One should use rapid inhalation appropriately and control the breathing technique specifically in certain rhythmic or melodic parts. It is essential to avoid improper breathing, such as breathing arbitrarily, playing while holding one's breath, or exhausting the breath without any reserve.

The improvement of breathing methods in Western and Chinese wind performances has changed from separate and independent techniques to all-inclusive and comprehensive ones. In the West, the progress of wind breathing techniques is associated with the advancement of respiration physiology and the growth of wind music as an art, resulting in a scientific system mainly based on thoracoabdominal breathing. In China, the study of wind breathing techniques started with the introduction of Western theories. After continuous domestic research, adjustment, and combination, it developed into a system that integrates an international viewpoint with special local features. Since the 21st century, interdisciplinary cooperation and technological support have promoted the wind-breathing techniques towards higher scientific reliability, uniformity, and individualization.

In the instruction of breathing techniques in wind music, it is necessary to follow the rules of skill acquisition and carry out according to certain stages: At the initial stage, emphasis should be laid on forming a correct scientific knowledge, correcting bad habits and mastering the basic principles of diaphragmatic breathing; At the intermediate stage, the emphasis changes to improving breath control and acquiring proficiency in breathing techniques, so that breathing can be combined with the instrumental technique; At the advanced stage, attention should be paid to the artistic use of breathing techniques, enabling breath to express music and promoting the formation of an individual performance style.

Breathing technique in wind performance includes both scientific accuracy and artistic expression, and its investigation and application are ongoing tasks. With the development of respiratory physiology, exercise anatomy, and the charm of wind performance, the future study of wind breathing techniques should improve the combination of physiological science and performing art, and find out more particular and individualized training methods. At the same time, the close contacts and mutual inspirations between Chinese and foreign techniques of wind breathing should also be strengthened. By incorporating the cultural background and artistic concepts of Chinese ethnic wind instruments, the progress in both the research and practice of wind breathing techniques in China can be effectively promoted. For wind players and teachers, it is significant to maintain a scientific research attitude and an open-minded academic viewpoint, continually exploring the fundamental principles of breathing techniques. Thus, scientifically based breathing methods can provide strong assistance to the artistic presentation in wind performance and accelerate the continuous advancement of wind music in China.

## **Disclosure statement**

The authors declare no conflict of interest.

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