INTERNAL ASPECTS OF FLUTE TECHNIQUE: A MIXED-METHOD

INVESTIGATION OF TEACHING STRATEGIES AND THEIR EFFECTIVENESS

by

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ABSTRACT

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Research into studio instrumental teaching has begun to determine the broad qualities indicative of effective teaching, however there is a need to assess the effectiveness of strategies as they are applied to specific instrumental techniques. The flute has elements of technique that are internal and this mixed-method study sought to assess teaching strategies for effectiveness in teaching tonguing, vibrato and throat/mouth/tongue shape. The literature showed three broad areas of strategies: visual models (anatomical or representative of shapes, colors), verbal descriptions (of internal physiology, imagery or vocal/speech techniques), and teacher modeling (with student imitation). A fourth category of "other" strategies, including devices, was also investigated to gain an overview of current practice. One hundred and fifty-nine flutists, who were either current or former flute performance majors, answered online survey questions rating the effectiveness of traditional strategies and added newer strategies for study in part two of the research. The data indicated that respondents preferred teacher modeling, the use of

vocal and speech techniques, verbal descriptions of internal physiology and imagery/creative visualization as their preferred strategies. The "other" strategies reported by participants were investigated using observations and interviews of nine participants. The strategies investigated were: spectral analysis, devices including straws, pinwheels, the pneumo-pro, the breathing bag, the breath builder machine, recording devices, brass-derived pedagogy including buzzing and finger breaths, and the use of Alexander Technique. The study found that there were four general categories of modeling that teachers used: aural modeling, visual modeling, verbal modeling, and kinesthetic modeling. The researcher found that while most high-level flutists rated traditional teaching strategies as the most effective a minority of flutists benefited from the newer strategies. It was also noted that the majority of flutists surveyed were professionals and had learned using traditional strategies. Future study focusing on student perceptions was recommended. It was recommended that teachers investigate alternatives to traditional strategies for use when needed by students. It was also recommended that more study be done on newer strategies to assess their overall effectiveness and relative usefulness compared with traditional strategies.

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INTRODUCTION TO THE STUDY

Introduction

This study sought to investigate strategies used to teach internal aspects of flute technique. The purpose of the study was to examine the strategies used by teachers and to find out how flutists rated the strategies for effectiveness. It was hoped that, as a result of this study, current practice will be better understood and that ratings given by flutists will add to the body of knowledge on effectiveness in instrumental teaching methods. A survey designed for a broad national and international pool was used to gain ratings for strategies found in the literature, and to find newer strategies involved in the qualitative section of the study. The interviews and observations sought to illuminate newer strategies as an addition to the body of knowledge on teaching internal or non-observable areas of instrumental technique. Transferability of results is possible to other instruments that have elements of internal, non-observable technique.

Summary of the Physical Processes Used to Play the Flute

The modern classical flute is a cross-blown wind instrument. Sound is produced by blowing across a hole in the tube of the instrument but is also modified by use of internal parts of the mouth and airway passages. The tongue is used to articulate the air stream, dividing the tone and also beginning the sound clearly. Most flutists use vibrato, which is

an undulation of sound commonly considered standard in most instrumental and vocal applications. The vibrato is produced internally in the player's air stream. As the air moves out of the body through the mouth, it passes through the airway passages of the player's throat, against the soft and hard palate, into the mouth, past the tongue and is directed across the flute aperture. While it moves through the throat and mouth and past the tongue, the shape and size of these areas can affect the sound by compressing the air, which can change air speed and restrict the amount of air moving out of the mouth. The opposite can occur where opening these internal areas causes the air to slow down but also allows the player to push through more air and to move it faster because of the larger opening. The flute is played only with air that exits through the mouth, so the air is not allowed to exit the body through the nose or else the playing will be impaired by a reduction of breath moving through the flute. The size of the mouth can be changed by the player by moving the jaw and by movement of the soft palate and the tongue. Tongue placement can also affect intonation, as can the size of the mouth and throat openings together with air speed and volume. The lips are formed into a shape, commonly called the embouchure, to facilitate directing the air across the embouchure hole of the flute. As the air enters the flute it creates an air-reed and tone is produced. This is not the same as a physical reed used by clarinetists, oboists, saxophone players and bassoonists, but is the name of the acoustic vibration of air that makes sound on the flute. The fingers are used to open and close keyed openings in order to facilitate the desired frequency. The elements of flute technique that are visible are the embouchure and the digital technique, as well as the overall posture of the player including the movements created by breathing. The elements that are internal and not visible are the passage of air through the throat

including the vibrato, the shape of the throat and mouth including the soft palate, and the position and movement of the tongue. These affect the tone quality, vibrato and also the articulation, commonly called tonguing.

Background, Context and Justification of the Study

There is a long tradition of classical western flute pedagogy descending from European practice, through emigrant populations and more currently through non-European-born musicians. Pedagogical tradition has been handed down orally and has been described in instructional methods, books, magazine articles and descriptive studies on the practices of flute teachers. Instructional strategies have addressed areas of flute playing that are external and hence observable, such as posture, hand position and embouchure (lip position) and also those that are internal and therefore not directly observable, including vibrato, tonguing, tongue placement, inside of the mouth and throat shape. Breathing, which is the process of bringing air into the body, creates external movements that are observable. Breathing theories and techniques have focused on techniques to control the air by abdominal muscles or chest compression (Kohut, 1992). Discussion of breathing has been characterized by focus on observable movements of the chest, shoulders and abdomen (Greene, 1980; Hill, 1995; Mather, 1980; Wye, 1985). Vibrato is produced internally on the flute, and depending on the source flutists believed it occurred in the diaphragm or throat (Galway, 1990). Tonguing likewise, is produced by the tongue in the mouth in various places by striking anywhere from the lip back to the soft palate (Floyd, 1990). Throat and mouth shape and the positioning of the tongue are also taught although they cannot be observed outwardly.

These aspects of flute playing cannot be taught by direct visual example (teacher modeling) and are difficult for teachers and students to assess because of the lack of visual evidence of the player's internal physiology.

Studies that used instruments to measure movement and placement of the tongue have been done using various scientific methods, but these are not practical as a regular diagnostic tool for teachers and students. This is because early experiments used potentially harmful x-ray technology, while more recent studies used expensive medical diagnostic equipment that also caused obstructive disturbance in the playing of the instrument (Patnode, 1999; Pool, 2004). One interesting finding using assistive technology was that player perception was unreliable as evidence of accurate movement or positioning of internal structures, as shown in the Patnode (1999) study which used fiber optic viewing devices to determine actual tongue position versus perceived tongue position in saxophone players.

Areas of physiology that are internal are critical to playing the flute. It would not be possible to play the flute without use of the inside of the throat, mouth and the tongue. Also, superior performance on the modern classical flute always employs tongued articulation and is generally expected to include vibrato. Without the use of the interior of the throat, tongue and mouth, these elements and good tone production would not be possible. Despite the many methods employed and recommended for teaching external and internal areas of flute playing there has been limited study on flute teaching, either of a descriptive nature or comparing approaches. Dissertations have been written describing

the lives and teaching practices of Clemente Barone (Butterfield, 2003) Philip Dunigan, (Guzzio 2002), Jeanne Baxtresser (James, 2008), and Michel Debost (Pintner 1998). Studies comparing the method books written by flute teachers profiled flute pedagogues of the 18th and19[th] century; Hotteterre, Quantz , Corrette and Boehm (Shaefle, 1989), and the 19th and 20th centuries; Henri Altes, Paul Taffanel-Philippe Gaubert, Marcel Moyse, and Trevor Wye (Etienne, 1988). Also, a descriptive study on the teaching of twenty university level flute teachers of the late 20th century compared participants' methods. The participants were flutists Julius Baker, John Barcellona, Samuel Baron, Frances Blaisdell, Julia Bogorad, Bonita Boyd, Leone Buyse, Linda Chesis, Michel Debost, Arthur Hoberman, Karl Kraber, Wilfred Kujala, Mary Posses, Paula Robison, Roger Stevens and Gary Woodward. (Lancaster, 1994). While these studies were descriptive of the practices of well-known pedagogues, they have not addressed the question of relative effectiveness of the methods described to teach either external or internal techniques used for playing the flute.

There have been studies on what broadly constitutes effective teaching in applied music (Abeles, Goffi & Levasseur, 1992) however these were concerned with general definitions applicable to all instrument groups and not the effectiveness of approaches for particular instruments, nor specifically for playing techniques involving internal physiology. A study on the common elements of teaching shared by noted teachers of various instruments (Duke & Simmons, 2006) found nine elements shared by noted pedagogues in instrumental teaching. While the focus of the study was to broadly name effective components of studio teaching, it did not differentiate between instructional

strategies for instrument groups or the techniques needed to play individual instruments. There was no differentiation sought for strategies used to teach external (observable) versus internal (not observable) areas of instrumental playing.

Methods for teaching internal techniques that were found in the literature included; verbal description of physiological structures, creative visualization or imagery, teacher modeling and student imitation, the practice of using visual models of internal physiology as an aide to understanding preferred placement of the throat, tongue or other internal physiology, and the use of other evocative images. There has not been study, as of writing, that categorizes the frequency of these or newer approaches, or that assesses them based on student's perception of their effectiveness. Therefore, teachers have relied on anecdotal evidence or tradition on which to base their teaching practice. There is a need to systematically examine how flute teachers are educating students in internal aspects of playing in order to reveal which are the most effective pedagogical approaches. A study on teachers' use of instructive strategies and students' assessment of their effectiveness is useful in identifying and evaluating the approaches used, including but not limited to verbal description, visual models and non-direct approaches such as teacher modeling and student imitation. There is also a need to examine current practice and to document newer approaches that are not discussed in the literature.

Problem Statement

    Research into effectiveness in studio music teaching has found general determinations

consistent with excellent teaching. These studies were useful in describing what are

effective elements that can be found within broad categories of teaching practices.

Teacher behaviors were described in all areas of instruction including inter-personal

communication, ability to model excellently, ability to teach technical aspects of the

instruments and general musical knowledge. These components of effective teaching,

however, are categorized in language that is not specific enough to apply to the teaching

strategies of each instrument. There is a need to understand how effective teaching

strategies are when applied to particular instruments. While each instrument has unique

physical properties, there is especially a need to understand the effectiveness of strategies

addressing internal areas of playing because they cannot be learned through direct

observation. Studies to date that were particularly focused on the teaching of the flute

have been descriptive in nature and have not sought to evaluate effectiveness. While the

established general measures of effectiveness can be more easily applied to external and

observable aspects of flute technique, they may not be applicable to aspects that are

internal and cannot be observed. There is a need to examine current practice and rate the

effectiveness of the strategies used by flute teachers to address internal aspects of

technique.

Purpose of the Study

There is a need to understand how the general determinations of effectiveness found by researchers in studio music teaching can be specifically applied to the teaching of each instrument, and to the techniques that are unique to each. A need to inform best practice in the teaching of the flute requires study into the nature of strategies used to teach aspects of the instrument's technique that are internal. The purpose of the study was to find out how teachers addressed internal aspects of flute technique, what strategies were being used to teach these areas and how flutists rated the effectiveness of the strategies being used. The study sought to determine how flute teachers were instructing students in areas that are not directly observable, such as the placement of the tongue, vibrato and the shape of the mouth and throat as they affect tone quality. The study gathered flutists' ratings on the effectiveness of strategies in an effort to gain empirical evidence of effectiveness. Also, an investigation into newer teaching strategies reported by flutists gained further insight into current practice and sought to enlarge the body of knowledge on teaching internal aspects of instrumental technique.

Research Questions

1. What is the incidence of use of the following instructional practices in the teaching of internal flute techniques such as vibrato, throat and mouth shape, tonguing and tongue placement?

      Verbal Description of:

         Internal physiology

Creative visualization/imagery

Vocal/Speech techniques

Visual Models of Anatomy

Visual Representations/Pictures of Shapes, Colors or Places

Teacher Modeling with Student Imitation

2. How do flutists perceive the effectiveness of these strategies?

3. Are some strategies for teaching internal flute techniques perceived to be more

    effective than others

4. What other strategies are being used to teach internal flute techniques?

Conceptual Framework

The conceptual framework devised to guide this study categorized teaching strategies for addressing internal aspects of technique on the flute. The strategies used to teach internal aspects of flute technique that were found in the review of the literature were shown at the top of this initial version, including a category of "other" strategies not yet found before the study took place. The possibility that application of a strategy did not lead to an improvement in the students' performance was shown as the option where the student was directed to attempt other strategies. The research questions were represented on the framework, which sought to find which strategies were effective according to flutists. The strategies for teaching external/observable areas (that were not the focus of the study but are necessary elements toward the goal of improved flute performance) were named and fed into the diagram near the goal of improved flute performance. It was assumed that methods that were not mentioned in the literature but were currently used to

teach internal aspects of technique would be found during the study. To represent those methods the category named "other" was included in the strategy area. The study sought to answer the research questions by filling in unknown data and understanding how flutists rated the traditional strategies. A completed conceptual framework for the study, as a result of new data, can be found in the Findings chapter.

**Teaching Strategies Addressing
Internal Aspects of Flute Technique**

Visual Models:	Verbal Description:	Teacher Modeling:	Other Methods:
Anatomical Drawings, Shapes, Places, Colors	Physiology, Imagery, Vocal/Speech Techniques	Student Imitation	To be determined by Study

Effectiveness of Strategy as Determined by Outcome for Each Student

Student does not display improved vibrato, tone and tonguing: try another strategy

Student displays improved vibrato, tone and tonguing

Effective Teaching of External Techniques

Student Demonstrates Improved Flute Performance

Figure 1:

Conceptual Framework for the Study

Procedure

A two-part procedure was used for this study. The first part was concerned with gathering information about how teachers were instructing students in internal aspects of flute technique. A survey directed at advanced students and professional flutists elicited effectiveness ratings of instructional practices that were grouped into traditional teaching strategy categories. Flutists were asked to specify their preferred method of instruction and name other strategies they had experienced or used. Participants in part two of the study were sought for interviews and observations in the areas of strategies reported by flutists in the survey. Specifically, these were strategies that were not found in the literature review and strategies that were innovative or that received notable mention by flutists in the survey. Observation and interviews were then conducted to investigate these strategies in order to add to the body of literature on flute teaching, describe current practice of new or notable strategies and to begin to investigate flutists' views on their effectiveness. The list of traditional strategies found in the review of the literature is displayed below:

- Verbal Description

    Internal Physiology

    Creative Visualization/Imagery

    Vocal/Speech Techniques
- Visual Models of Anatomy

- Visual Representations/Pictures of Shapes, Colors or Places

- Teacher Modeling with Student Imitation

- Other Methods Including Use of Devices

Assumptions

The researcher assumed that advanced flute students who were music performance majors had had at least two flute teachers, giving them exposure to a few teaching strategies. The researcher also assumed that professional respondents had studied with at least two teachers and had knowledge of various teaching strategies. There was also an assumption that the literature review was not a complete description of teaching practice because of lack of access to out-of-print material, language barriers to reading foreign material, and the possibility of missing some relevant material. It was also assumed that more strategies would be found as a result of the survey, reflecting current practice, than were found described in the literature review.

Definitions

Internal techniques on the flute are defined as critical features of flute technique that cannot be seen without assistive devices such as fiber optic camera, ultra sound or x-ray, all of which are not practical, are obstructive and/or dangerous to use routinely. The areas for consideration in this study were: the inside of the mouth, the tongue, the throat and other cavities in the nose. Flutists who participated in this study used the terms "mouth, tongue and throat" with limited reference to anatomical names for internal features. For this reason, and the majority use of these terms in the literature, the terms "mouth, throat

and tongue" were used in this study. Internal techniques that have no observable qualities include tonguing and vibrato. Tonguing, also called articulation, occurs inside the mouth except in instances when the player uses a tongue strike between the lips, usually for a percussive effect. Vibrato occurs internally on the flute, except infrequently when a player attempts to use the jaw as in saxophone vibrato. Jaw vibrato is not commonly acceptable in flute playing and is not part of this study. Reactive cheek flapping is sometimes noticed in flutists, however the cheeks are not used to generate vibrato and flap secondarily to changes in the air stream. The use of the mouth, tongue and throat in flute playing also are involved in the production of tone or sound. The tone also has elements of external and observable technique by involving the outside of the mouth, known as embouchure, however only the structures that are internal are part of this study.

Strategies for teaching internal aspects of flute technique were defined for the purpose of this study as teaching modalities used to address these areas. Within each teaching modality there were differences in teachers' specific methods and these were not the subjects of this study. For example, while teachers may use speech syllables, the actual syllable used was not being compared, nor the specific visual models or visualizations.

Definitions of Teaching Modality Categories

Verbal Description

The teacher uses words to teach. Verbal description can be divided into two uses of words: descriptive and non-descriptive, as defined:

Descriptive of Physiology. The teacher uses words to describe internal physiology and the desired placement of parts of the anatomy.

Creative visualization/imagery. The teacher refers to imagined states, colors, artistic impressions, memories, feelings and other allusions.

Vocal/Speech Techniques

The teacher uses references to techniques used for singing or speaking.

Visual Models

The teacher supplies the student a picture or drawing of internal physiological structures, or a visual representation of the shape, color or picture of the desired sound.

Teacher Modeling

The teacher plays an example and the student imitates the sound heard. Observation of the teacher's internal physiology is not part of this learning strategy since the techniques being studied are internal. Although students continually employ this method in combination with other teaching strategies, it is defined as a separate category when used alone.

Other methods

The use of practice devices used to address internal techniques has been observed by the researcher but were not found mentioned in scholarly literature. Other methods found as a result of the study were added to this category and are discussed in the Results, Findings, Discussion and Conclusion chapters.

Delimitations

This study was conducted to examine the strategies used to teach internal aspects of flute technique as defined in the above broad categories, not to compare differences within the categories. Distinctions between subtle directives, as in preferred syllables for tonguing, the exact words used by teachers, the effectiveness of different visual models or images used, were not the subjects of this study. Theories on vibrato production, although in need of further study, were not examined or compared for effectiveness in this study. Images used by teachers, both anatomical diagrams and evocative pictures, were not rated for effectiveness, nor for their relevance to flute playing when taken from vocal literature. This study sought to broadly compare teaching strategy categories and find out how flutists rated them. Also, this study examined newer strategies named by participants and did not intend to endorse them as a result of this preliminary investigation.

The Researcher

My educational background as a flutist started in New York City as a student at the Mannes College of Music Preparatory Division and continued through the Juilliard Pre-College Division, Manhattan School of Music, and Teachers College, Columbia University. As a young learner I was also a student at arts camps in the New York area, and at various music festivals including the Aspen Music Festival, Bowdoin College Music Festival and the Scotia Music Festival. During High School and undergraduate

work I played in the New York Youth Symphony. Including master classes, I have

studied with close to a dozen well-known flutists. The teachers I studied with

represented several "schools" of playing, including teachers from the French and several

American traditions. The schools of playing I experienced descended from Alain

Marion, Jean-Pierre Rampal, Julius Baker, Thomas Nyfenger, Arthur Lora and Keith

Underwood. I have also observed and spoken with many more flutists about teaching.

While I was engaged in performing and teaching for two decades in New Zealand, I also

continued to study privately because of my ongoing interest in teaching strategies for

personal and student development. As a performer and teacher I was invited to various

flute conventions in New Zealand, Australia, Mexico and Russia where I also had the

opportunity to meet and observe other teachers. I have taught flute, wind and orchestral

students at all levels as a teacher in the New Zealand schools while I was a lecturer in

flute and music education at the New Zealand School of Music (previously the

Wellington Conservatorium of Music, Massey University) from 1989-2006. It has been a

continuing interest for me to find the most effective methods to teach students to play the

flute.

Summary

This chapter gave an overview of the background, context, purpose and justification of

the study. It also included the research questions, plan, assumptions and definitions and

gave background information about the researcher. The next chapter is a review of the

literature, which examines studies on effectiveness in studio music teaching and teaching

strategies used to teach internal aspects of flute technique that were found in descriptive

studies and methodological writing. The literature review is followed by a methodology

chapter, which discusses the data-gathering procedures used in this study, including

survey, observation and interview strategies. The results and findings of the study follow

as two chapters, reflecting the quantitative and qualitative data that were gathered. A

discussion chapter follows that synthesizes the results and findings with the body of

literature reviewed, and a conclusion chapter summarizes the study and makes

recommendations for further study.

Chapter II

REVIEW OF THE LITERATURE

Introduction

Flute teachers have used many methods for teaching tonguing, vibrato and mouth and throat shape (internal flute techniques) and these will be examined in this review. Literature on flute teaching strategies is composed of descriptive studies, books, articles and instructional methods. Studies to date have not been conducted with the purpose of looking at players' views on the effectiveness of teaching methods specifically applied to the teaching of the flute, therefore this review will begin with an overview of study on effectiveness in the general area of studio music teaching. Studies on effective teaching have begun to emerge in the field of instrumental studio music teaching. This review of the literature examined studies that looked to define effective teaching strategies in instrumental and vocal music teaching. The examination of best practice has resulted in the categorizing of components that can generally be applied to the teaching of all instruments and voice. This review will look at how studies that created scales for measuring effectiveness in studio music teaching apply to aspects of internal flute instrumental technique. The components of effective instruction found in those studies were then examined to see if they apply to the teaching of internal techniques on the flute.

This review of the literature will include descriptive studies, non-empirical literature

including books, instructional method books and articles on flute teaching. Study

conducted on effective teaching on the flute has been non-empirical as of the time of this

study. Dissertations relating to flute teaching have been descriptive of teaching

techniques and outlined comparisons among them. Descriptive studies on the flute have

been concerned with describing the professional lives and teaching techniques of well-

known teachers. This review summarized the comparative descriptions of those teachers'

methods as related to aspects of internal flute technique. Studies, books, articles and

method books written about the flute were also examined to investigate existing strategies

used to teach aspects of internal flute technique and were then summarized and

categorized. Finally, this review will classify the strategies used to teach internal aspects

of flute technique based on teaching modalities that are verbal, visual or model based.

Teacher modeling, or demonstration, is a major category and historically the most

popular teaching strategy. A discussion on the teacher modeling strategy's limit to aural

perception, when applied to internal techniques, will also be included.

Study on the Teaching of Music in Studio Format

Instrumental music education is generally conducted in private, one-on-one lessons,

especially at the advanced and university levels. Study has been done into the nature of

private teaching and to determine best practice. Because studio music teaching is taught

in a one-on-one format it has been argued that study involving classroom teaching is not

entirely applicable (Abeles, Goffi & Levasseur, 1992). Therefore studies have been

conducted to examine and classify broad categories of studio music teaching behavior

and to look for evidence of methods that can be defined as effective (Abeles, 1975; Abeles, Goffi & Levasseur, 1992; Duke & Simmons, 2006). These and other studies have looked variously at student measures of effective teaching and at common elements of teaching held by music teachers who were determined to be master teachers. Criteria for participant selection were either employment or that the teachers had received educational prizes. The elements found were grouped in broad categories that included technical instruction and also inter-personal behaviors indicative of effective rapport. This review concentrated on the areas related to technical instruction and not on psychological or inter-personal measures.

A study that sought to develop a survey instrument for evaluating faculty in applied music instruction focused on rapport, instructional systemization, instructional skill and musical knowledge (Abeles, 1975). A facet-factorial approach, developed by the researcher in earlier studies, was the approach used (Abeles, 1971 and 1973). This study developed a rating scale using music majors with faculty evaluations of students used for inter judge reliability testing. The results supported the assertion that faculty can be judged by the quality of their students, however study into specific teaching strategies was recommended.

A further study by Abeles, Goffi and Levasseur (1992) was an effort to categorize the elements of effective applied instruction. The definition of applied studio instruction was shown to be so different from other types of classroom teaching that study was needed into what is a very different situation for teachers and students. The study mentioned

again that teachers generally judged another teacher by assessing the quality of their

students. Such a teacher-measured criteria seemed to look at student outcomes as the

sole criteria for judging the effectiveness of teaching. Although this could be one method

for assessing teachers it could be an incomplete method, not allowing for other factors

that could lead to positive student outcomes regardless of the most recent teacher's

abilities. Efforts have been focused on developing more conclusive ways to rate for

effectiveness in teaching.

While teacher-named criteria for effective teaching is valuable, student measures are

also a valid means for examining teaching. In the 1992 Abeles, Goffi and Levasseur

study music students were asked to name criteria of effective teaching by describing

teachers who stood out for them. Both music majors and non-majors were examined in

separate scales. Original statements were organized in a Likert-type rating scale form,

resulting for the music majors in five areas: rapport, instructional systemization,

instructional skills, musical knowledge, and general instructional competence. 30 items

were then selected to create the Applied Faculty Student Evaluation Scale for Music

Majors (AFSESMM). Validity was addressed by using a faculty rating system of the

students who completed the AFSESMM.   A second study was conducted with non-music

majors, which resulted in the addition of criteria related to teacher flexibility. The results

of the validity test were strong enough to determine that student rated measures were

accurate. It is therefore justifiable to examine the effectiveness of teaching based on

student ratings when validity is triangulated using student assessment. This study shows

the importance of examining both teacher-nominated and student-nominated criteria for

teaching method assessment. Also, the broad categories found to be important for determining effective teaching in this study can be used as areas for further specific study into the teaching of instrumental techniques. The areas of effectiveness highlighted in the study are valid as they would apply in a general sense to all instruments, however when focusing on the teaching of internal aspects of technique there needs to be focus on the specific teaching methods used to address these areas. It may be that overall the statements made about effective teaching apply to most instruments, however some aspects of teaching may not be effective for areas of technique that are internal. The statements used in the varimax matrix of the AFSESMM that could be specifically applicable to the teaching of internal areas of flute technique are outlined in the following discussion. The implied modality of teaching is given under each statement. The statements from the AFSESMM and the categories from which they came are discussed below:

II. Instructional Systemization

"He/She gives explicit directions regarding what to practice." This statement suggests verbal description.

"He/she outlines a system of teaching for the student so the student knows where he/she is heading." This also implies verbal description

III. Instructional Skill

"His/Her explanations are clear and concise." Again, this statement can be defined as verbal description but what kind of verbal description is not outlined.

"His/her method of teaching gives the student insight into teaching as well as performing." This statement shows teaching ability but is not specific in what way it is shown.

"He/she is unable to diagnose technical problems." This negatively framed statement alludes to the teacher's inability to find any way to correct technical problems. The opposite is stated in the following example of technical knowledge: "He/she is able to correct technical difficulties."

V. General Instructional Competence

"He/she has difficulty communicating ideas." This negatively framed statement refers to communication, which could be verbal or, in the case of music teaching, a positive modeling of the desired outcome.

These statements would be useful in assessing the effectiveness of teaching internal aspects of technique. Although some of the statements are general and can be included in several teaching modality categories, they can apply to aspects of technique that are internal. The statements can be categorized in the following table 1:

Table 1

Summary of AFSESMM Statements Applied to Teaching of Internal Aspects of Flute

Technique from Abeles, Goffi and Levasseur (1992)

Statements	Type of Instruction				
	Verbal Description of Physiology	Creative Visualization/ Imagery	Vocal/Speech Techniques	Visual models or representations	Teacher Modeling
Gives Direction	X	X	X	X	X
Discusses Goals	X	X	X		
Explains Clearly	X		X		
Gives Insight	X	X	X	X	X
Corrects Technique	X	X	X	X	X
Communicates	X	X	X	X	X

Table 1 shows that the categories of the AFSESMM are too broad to assess teaching when examining strategies addressing the internal aspects of technique. They do, however show the possibility for verbal direction to be used in several areas of

instruction. The other broad statements could allude to many of the areas of teaching that are non-verbal.

Common Elements of Effective Teaching by Master Teachers

Another study looked to find elements of effective studio teaching in music. The researchers chose the teacher participants based on educational awards they shared (Duke & Simmons 2006). The assumption was made that the teachers studied were effective because they had been given an educational award.   The researchers observed and compared the behaviors of the three teachers chosen for the study. Validity was based on the agreement of researchers, who viewed and discussed videotapes of lessons. The shared elements of teaching were then assumed to be symptomatic of effective teaching. The study included three teachers; one string teacher, one piano teacher and one wind teacher. The wind teacher was an oboist. It is notable that effective areas of teaching were found to be common amongst teachers of differing families of instruments, however the findings were therefore non-specific to the techniques involved in playing each instrument. In both this and the Abeles, Goffi and Levasseur (1992) study the focus was on general elements of effective teaching, which included a broad range of areas including interpersonal relationships, musicality and also the technical considerations of the particular instruments. The first category of results in this study was in the area of goals and expectation. The first two findings were related to the teachers' skills at assigning appropriate material and their own musical knowledge of the material. The third area related to the teaching of internal techniques. The statements that are relevant to this study are presented below, while discussion of each point follows the statement:

"The teachers demand a consistent standard of sound quality from their students". The discussion of this point specified that teachers identify problems with faulty technique. The teachers then asked the student to repeat the material until the correct technique was used and the tone was beautiful. This implied that the teachers used methods to correct technique but did not state what those methods were. When applied to internal techniques this implied that the teacher knew of successful methods for correcting areas that are not observable. Of the three instruments involved with the study, the oboe was the only one that had elements of internal technique. Specific examples of how the teacher addressed these areas were not given. The rest of the statements in the area of goals and explanations referred to lesson targets relating to the proximinal placing of tasks and the teacher's memory of where the student was in their progress.

The next section of statements was under the heading of Effecting Change. The researchers found that continuity of the music was stressed and stops were made only to address problems. Teachers were seen to have targets for the lessons. Again these were general statements however the following statement addressed technical correction: "Any flaws in fundamental technique are immediately addressed; no performance trials with incorrect technique are allowed to continue." The explanation of this statement stated that teachers paid attention to physical movements. It was not stated in the study that there are physical movements on some instruments that are internal and therefore the statement did not address these areas. It is hoped that future similar studies on

instruments with internal aspects of technique would specifically include focus on the teacher's ability to diagnose and correct internal areas.

The next statements in the area of "Effecting Change" referred to the speed and pace of lessons and student interpretation of music. The final category in this study was called Conveying Information. The first statement concerned teacher verbalization: "Teachers make very fine discriminations about student performances; these are consistently articulated to the student, so that the student learns to make the same discriminations independently." This statement could apply to many areas of music and apply generally to technical considerations, including external and internal techniques. The next statement was more specifically addressed to technique: "Performance technique is described in terms of the effect that physical motion creates in the sound produced." This statement implied that technique is the result of "motion." When applying this statement to internal techniques, the teacher would need to have some way to affect the internal physiology that related to the resulting sounds instead of relying on observation as with external techniques. Again, the method for doing so was not discussed.

The next statement referred to technique as it relates to musicality: "Technical feedback is given in terms of creating an interpretive effect." This statement referred to the primary focus of musical consideration being the reason behind recommended technical change. This seemed obvious musically and artistically, but it deserved to be stated that the techniques involved with playing a particular instrument exist for the purpose of improving musical effects.

The next two statements concerned the weighting of the teachers' negative and positive feedback and deserved to be studied further in relation to overall teaching and learning, but are beyond the scope of this study. The final statement related to teacher modeling: "The teachers play examples from the students' repertoire to demonstrate important points; the teachers' modeling is exquisite in every respect." Excellent teacher modeling is a mainstay of many theories of effective music teaching. It has been argued that teacher modeling should be the dominant or the only method for teaching music, as is discussed later in this review of the literature. Modeling is useful when teaching music, however when this strategy is applied to the teaching of internal aspects of technique it is an aural example, not a visual example. An excellent model can be heard however the means to the results are not necessarily evident to the listener because of the lack of a visual model. The model provided by the teacher is only aural because there are no physical movements that can be observed. Students are rendered blind learners when aural modeling is used as the sole method for teaching internal aspects of technique.

The statements in this report that apply to teaching internal techniques are listed according to the teaching modality classifications in Table 2:

Table 2

Summary of Statements Applied to Teaching Internal Aspects of Flute Technique from

Duke & Simmons (2006)

Statements	Type of Instruction				
	Verbal Description of Physiology	Creative Visualization/ Imagery	Vocal/Speech Techniques	Models or Representations	Teacher Modeling
Makes Discriminations	X	X	X		
Methods to Correct	X	X	X	X	
Addresses Flaws	X	X	X	X	
Articulates Discriminations	X	X	X		
Describes Physical Motions	X			X	
Gives Technical Feedback	X			X	
Provides Exquisite Modeling					X

The statements in this study showed that there are many methods to successfully teach instruments. The focus of this study was finding broad generalizations of strategies that were indicative of effective teaching, not the specifics of instruction related to the teaching of individual instruments. The methods and merit of the instructional strategies used for each instrument, including those with internal areas of technique, were not the focus of this study. The authors recommended that in future study researchers should investigate precise methodologies that are specific to each instrument and the techniques needed to play them.

Other Studies on Effectiveness in Music Teaching

An overview of research into studio music teaching by Richard Kennell in 2002 gave a summary of methods and areas addressed. Although a few methods concentrated on psychological or inter-personal aspects of teaching and were not relevant to this study's focus on methods addressing internal aspects of technique, many were relevant to this study. Kennell's overview of evaluation methods mentioned the five areas of the Applied Faculty Student Evaluation Scale (Abeles, 1975) that were already discussed in this review. Also mentioned was the Rosenthal (1984) study of modeling in music teaching, which is discussed later in this review. Theories on what has become known as Teacher Scaffolding were mentioned, which included teacher modeling as well as task manipulation, although the methods were not specified. A previous theory of teacher scaffolding called the Teacher Attribution Scaffolding Theory (Kennell, 1989) outlined general teacher behaviors that included marking critical features, demonstrating and task manipulation. These three behaviors were tested and found to all be effective, however

marking was less effective on its own. The resulting theory was that each of these

strategies was effective based on the circumstance it was used in. Further study into

scaffolding, later termed Proximinal Placement in a study on the teaching of violinist

Dorothy Delay (Gholson, 1998) discussed preparatory and facilitative behaviors. Her

study was in the realm of string instrumental performance, where all physical movements

are visible, but these terms were general enough to be considered by the researcher as

relevant to all music teaching. The overview included general discussion on studio

teaching in music and addressed methodological concerns. These are discussed in the

methodology chapter of this study. Kennell concluded his review with helpful questions

to guide further study. These statements are discussed below and are paraphrased from p

253-254.

   The first question posed by Kennell concerned how one can study music lessons

without changing the lessons. This is also discussed in the methodology chapter of this

study. The next question addressed how the teacher used language to change student

behavior. This is of interest when applied to specific instruments, techniques and

specifically internal techniques. As part of this study into strategies for teaching internal

aspects of flute technique, language was categorized by its function, whether to describe

something physical, evoke images or visualizations or to describe techniques related to

speech and singing. Kennell's next question concerned the tools in the teacher's

pedagogical toolbox. This statement referred to all areas of teaching including the

teaching of internal techniques. A further observation by Kennell relating to this question

was that teaching strategies may be dependant on relationships among variables. One

variable that is addressed in this study is that certain techniques are internal and therefore

not observable. Kennell also recommended comparing teachers within a medium. This

narrowing of research would result in a further refining of the empirical literature on

teaching strategies. He stated the need to learn more about the process of making

diagnoses, and employing prescriptive interventions, which implied being more specific

about teaching areas and the techniques addressed. This study seeks to address those

concerns. Also in the area of methodology, Kennell stated that student lesson

interventions function like miniature single case studies, a statement that could guide

future study. He also theorized that each teacher intervention tests an unstated

hypothesis, and implied that data needs to be collected and analyzed on those hypotheses.

This study on the effectiveness of particular strategies on internal technical areas could be

seen to address this suggestion. Kennell concluded with his belief that some basic

qualitative research methods should be included in the professional preparation of future

performer-practitioners. It is hoped that the present study addressed this

recommendation.

Effectiveness Studies

It can be argued that broad or general measures of effectiveness may not apply to the

teaching of internal techniques. Studies that measure teachers' broad technical

knowledge begin to address such specifics, but as of writing are too general to make

determinations on the effectiveness of teaching modalities applied to all areas of

technique including those that are internal. These and other studies gained information

about general teacher behaviors but not about effectiveness of the methods of teaching as

applied to specific areas of technique or to specific instruments. It has been agreed that

teachers need to have technical knowledge, and this could be assumed to concern

physical aspects of technique, however general studies have not differentiated between

the knowledge (and practical methods) for teaching external/observable as opposed to

internal/not observable aspects of instrumental technique. Reference to "physical

movements" (Duke & Simmons, 2006) or "instructional skill" (Abeles, Goffi &

Levasseaur, 1992) are general. As of writing, there are descriptive and comparative

studies on flute pedagogy but there have been no studies seeking to empirically establish

the effectiveness of teaching practices. Other studies on effective methods for teaching

music focused on creating measuring scales for judging the broad effectiveness of

teachers and general teaching techniques. The development of ratings scales has been an

important tool in studying effectiveness and will be useful as applied to the more specific

teaching strategies of each instrument.

Developing Rating scales for Teachers of Voice

Although all wind and brass instruments have some elements of internal technique, the

voice is almost entirely produced in ways that are not observable. Study into vocal

teaching is therefore somewhat applicable to the teaching of the flute and other winds and

brass. Although the vocal chords are not activated while playing the flute, the throat,

airways and tongue are used to conduct air. Much of vocal teaching in these areas has

been mimicked in flute teaching, which is discussed later in this review. Because some

flute teachers use vocal pedagogical language in their own methods it is useful to look at

a study into effective vocal teaching.

A study that looked to develop a measure for vocal instructional effectiveness (Goffi, 1996) used student measures of effectiveness. Students were asked to make statements describing their teachers. Survey results were developed into an Applied Voice Teacher Rating Scale (AVTRS) that was then used to gather information about effective strategies. Analysis and sub scales were used to create a 30-item scale. An item pool of statements was created and then the students rated their teachers according to the item pool. The results were validated by comparing student ratings of their teachers with the teacher's assessment of the student's work through semester grades. Statements were classified under the areas of vocal technique, instructional skill/communication, rapport, instructional organization and personality.

The areas of teaching profiled in this study that are applicable to teaching internal aspects of technique on the flute were: technique and instructional skill/communication. Most of the statements were general in nature and were in the areas of creative visualization/imagery, teacher modeling and physiological direction. The statements from those categories that are relevant to the current study on internal technique are copied below each category:

Technique

....has the ability to assist me in achieving growth in my …ability.
He/she has well-rounded knowledge of technique….
My teacher is very clear about the kind of feeling needed…
He/she works to center the sound.
He/she makes me do … exercises which don't work
He/she gives lots of examples of how sound is formed and feels including visual and

descriptive explanations.

He/she is very knowledgeable about…problems.

His/her warm ups clear up the technique

He/she explains what is physically happening….

He/she gives me a physical attitude (neck, mouth, tongue) which turns out to be
specifically helpful.

He/she gives me lots of visualizations.

My teacher enables me to understand my problems and learn how to fix them.

Instructional Skill/Communication

He/she knows and understands how to fix problems…

My teacher speaks to me in terms too abstract to understand.

He/she is a great technical and practical teacher.

He/she is concerned that I understand the concepts.

He/she uses images or examples which I can relate to.

He/she makes thorough explanations.

He/she can easily explain how to change the quality of my voice in a way I can
understand.

He/she never explains anything so I never know what I am doing wrong so I never
improve.

He/she explains everything so that I understand what is being accomplished.

My teacher explains concepts…. That are easy for me to understand.

The statements on the AVTRS can be classified into three areas, description of

physiology, creative visualization/imagery and teacher modeling. They have been

summarized into three descriptors: explanations, feelings and images. The category of

explanations was a summary of statements referring to physical aspects of singing.   The

category of feelings refers to statements that were the teacher's description of a feeling,

and images refers to imagery given by the teacher to help the student in some area of

vocal technique. None of the statements refer specifically to the use of visual models and

therefore this category is not included on the chart below. The category of vocal or

speech technique has also been omitted from this table because this table represents vocal

pedagogy directly. The remaining categories are shown in table 3:

Table 3

Summary of Statements on Effective Teaching Applied to Teaching Internal Aspects of

Flute Technique from Goffi (1996)

Statements	Type of Instruction			
	Verbal Description of Physiology	Creative Visualization/ Imagery	Models or Representations	Teacher Modeling
Explanations	X			
Feelings		X		
Images		X		
Examples				X

The study recommended that future studies look more specifically at the effectiveness of teaching in specific domains of technique, and this statement can be applied equally to the study of flute pedagogy.

Another vocal study focused on teaching directives relating to breath support (Spillane, 1987). The study used a multi-part Delphi method to find consensus among voice teachers on language used to teach one area of vocal technique. The study acknowledged that many methods were used by teachers, including demonstration

(modeling), verbal methods including imagery, language that the researcher terms "idiosyncratic", and non-verbal methods, however the study focused on the directives that teachers considered to be most effective. The respondents in the study were members of the National Association of Teachers who responded to three iterations of a survey. The categories of teaching directives found were summarized as imagery, vocal exercises and explanations of physiological processes. The majority of the directives were physiological in nature. Disappointingly, many of the respondents gave inaccurate descriptions of physiology, particularly the diaphragm, resulting in impossible directives if taken literally. This error was also found in literature on the flute and is discussed later in this review. Since consensus was the aim of the Delphi study, the researcher recommended further study to ascertain the effectiveness of the directives teachers gave. Also, the researcher noted that there was no evidence that teachers were using the directives they named as effective and more research was needed into the nature of practice. Overall this study classified the kind of verbal directives vocal teachers used into the following groups: imagery (defined for the current study as Creative Visualization/Imagery) and descriptions of physiological processes, as well as the practice of assigning technical exercises. Also, teacher modeling was named as another modality useful for teaching internal areas of technique.

Dissertation on Flute Teaching Comparisons

Descriptive studies of master teachers and the writings of flutists on playing and teaching are the main sources of scholarly information about teaching the flute. This section of the literature review will look first at comparative studies, then at descriptive

studies. The strategies used to teach aspects of internal flute technique that are included in each study will be discussed in depth.

A descriptive dissertation by Lancaster (1994) compared the teaching practices of 20 flute teachers and catalogued techniques for teaching the flute that were found in the literature. This non-evaluative study compared teachers chosen based on employment status. The study looked at all areas of teaching the flute but did not specifically look for effectiveness of the teaching methods and instead assumed the methods' effectiveness based on the selection criteria of the participants. This study consisted of a catalog of teaching behaviors and published methodologies, and it categorized teaching behaviors according to flute techniques. The study looked at all areas of flute technique including the areas that are internal and compared teaching approaches amongst the teachers profiled and those in published literature. A survey instrument was completed by participants and included open, partially open and closed questions. Consensus or difference of opinion was noted in each technical area. The study did not seek to establish effectiveness empirically but instead interpreted differences in teaching strategies as evidence of the availability of multiple effective methods. This assumption is part of the validity claim of the study, which is based on the reputations and employment status of the teachers surveyed. Effectiveness of methods was assumed because of the teachers' reputations, therefore variables were limited to the teachers' preferred methods.

The need for empirical measures of effectiveness is different than validity claims that are based on employment status. There is the possibility that the overall effectiveness of

each participant's teaching does not include each specific domain of teaching. It is possible that teachers are effective in some areas of technique but not all, or that student variables compensate for areas of their teaching that are not effective, such as a student having already become proficient in an area that the teacher does not address in an effective manner. It is therefore important to investigate the teaching strategies teachers use empirically to establish best practice.

The areas of internal technique that were included in the Lancaster study were: tone development, vibrato and tonguing. Each of these domains was also discussed in the review of literature section of the paper. Areas of disagreement among flute teachers were assumed to be evidence of multiple successful intervention strategies. For the remainder of this review, teaching strategies will be discussed in subsections, along with the findings in other descriptive studies and non-empirical literature. The subsections will be classified according to the type of teaching modality used to address the areas of flute playing that are internal, including tonguing, vibrato and mouth/tongue/throat shape as they affect tone.

Dissertation Comparing Flute Method Books

A study that compared teaching methods looked at historical treatises and method books on flute playing (Etienne, 1988). This study's purpose was to show the changing demands on flute playing as seen through a progression of method books through time. The author also evaluated methods based on the author's preference for particular teaching styles. The author made comparisons and then made subjective comments and

determinations about the value of each teaching technique. While this dissertation took more of the form of an essay, interesting comparisons in the methods of five pedagogues were made. The pedagogues were Henri Altes, Paul Taffanel, Philippe Gaubert, Marcel Moyse and Trevor Wye. The pedagogues lived from the periods starting in the 19th century to present day, and were selected based on their writing of concise and lengthy treatises on flute playing. Comparisons were made in the methods addressing many areas of flute technique, however the only internal area covered in this dissertation was tonguing. This may be because the older pedagogues, Altes, Taffanel, Gaubert and Moyse, never wrote about any other internal technique in their method books. The lengthy comparison of tonguing syllables in this book, and the hypothesis given by the author about language differences in their pronunciation, dominated this study. These differences in syllables will be further discussed in the section of this review concerning vocal or speech techniques. Overall this study served to compile comparative information in a useful way, but the method of determining the effectiveness of the strategies used by teachers was not empirical.

Dissertations on Flute Pedagogues

There have been dissertations written as of date that are primarily concerned with describing the careers and teaching strategies of well-known flute pedagogues. The purpose of these studies was to record the career accomplishments and teaching strategies of noted flutists. The studies were biographical and descriptive in form. These studies function much as other books and articles in the literature and will be discussed with other non-empirical literature.

Teaching Strategies for Internal Aspects of Flute Technique

A summary of the teaching strategies found in the literature used to address internal aspects of flute technique follows. The categories of literature examined were: instructional method books and books and dissertations that were comparative and non-empirical. Scholarly literature was the basis of this review. Although there have been many informal and self-published flute newsletters available, these did not meet the editorial review criteria for inclusion in this review. Sources that passed a thorough review process were consulted for this study. The sources are defined as follows: Instructional method books include music and are used directly with students in lessons and during the student's practice sessions. They often include written information and directives and further explanation. Examples of these include the Belwin Mills series, Rubank series, Tune a Day series and methods written by individual authors (Greene, 1980, Louke & George, 2011). Books about flute playing may also include musical examples but not entire pieces or exercises, and are not used in performance (Galway, 1990; Krell, 1973; Nyfenger, 1986; Toff, 1985). Both methods and books about the flute give recommendations of strategies for flute techniques based on the opinion of their writers. They may also include references to historical writings or other methodologies, chosen because the authors agreed with them. Thus, these writings are instructional in nature and are not research-based.

A surprisingly large number of authors did not mention strategies for teaching and learning internal aspects of flute technique, particularly tone and vibrato. These authors

discussed tone purely as a function of the muscles on the outside of the mouth, also

referred to as embouchure (Altes, Gaubert, Moyse and Taffannel as cited in Etienne,

1998; Bates, 1969; Ballantine, 1971; Harrison, 1982). French flutists Rampal, Debost and

Marion understood vibrato as being produced naturally or as a byproduct of feeling

(Cohen, 2003; Pintner, 1998). These and other authors relied on teacher modeling and

student imitation or used creative visualization or imagery, when teaching vibrato (Krell,

1973; Wye, 1985). These are discussed in the separate sections that follow.

Verbal Description of Physiology

Verbal description as found in the literature was divided into various categories.

Firstly, verbal description of internal physiology, directives for tongue placement,

shaping of the throat and mouth physiology were often used. Lancaster (1994)

summarized the methods 20 university level teachers gave for directing students to open

the throat, open the mouth as far as possible and shape the tongue in various ways. These

were directives given verbally by teachers who participated in a survey for that study.

Other verbal directives to place the tongue in various parts of the mouth, with

explanations, were found in books and methods (Morris, 1991; Berger, 1973; Galway,

1990; Walton 2005). The Belwin Mills method began with basic principles for the flute

student, among them a directive on tonguing: "Tongue starts on ridge just above teeth."

(Weber & Steensland, 1969)). This simple directive was repeated in other books, such as

James Galway's discussion on articulation, " By briefly touching the hard part of the

palate above the teeth, the tongue interrupts the stream, so separating the notes" (Galway,

1990). Research into the validity of these directives or into the correct implementation of them on the flute has not been done as of writing.

Another dissertation looked at the physiology of the mouth, throat and nasal cavities as related to flute playing (Walker, 1995). The purpose of this study was to expand on the teaching of the late William Kincaid, formerly of the Philadelphia Orchestra and Curtis Institute of Music. The author used references to vocal technique and verbal description of physiology as well as visual diagrams to explain Mr. Kincaid's verbal directives concerning the mouth and throat, such as a quote from William Kincaid, " To play loudly, open the mouth to create a big space between the teeth, as singers do" (Walker, 1995). Another quote came from an interview with former Kincaid student Robert Willoughby, "Obviously we want a very open feeling in the mouth and to be physically relaxed not bent over going into the music." Much of the study referenced vocal techniques including vowel sounds discussed below in the section on speech techniques. While Mr. Kincaid and another noted pedagogue, Joseph Mariano, were quoted in the study, the study is in fact an expansion on Mr. Kincaid's teaching strategies. The author included visual diagrams from vocal literature and physiological discussion as an explanation of Mr. Kincaid's possible intent in his original teaching. The author's directives relating to cheek inflation were not part of Mr. Kincaid's or Mr. Mariano's teaching. The implicit conclusion was that the author believed that additions to Mr. Kincaid's verbal directives were necessary for the teaching of aspects of internal technique such as tone quality.

Study on verbal description of physiology and teacher directives toward the preferred placement of internal structures poses difficulties due to the very nature of internal techniques. Assistive technology has been used to gain visual evidence of internal structural placement (Pool, 2004), however study of tongue placement on the saxophone showed that subjects were often not aware of the placement of their tongues (Patnode, 1992). This was found even when the players stated that they had placed them in a forward or backward position. Using fiber optic imaging, Patnode studied saxophone players performing in the highest register of the instrument and asked them to state their tongue position. The player participants in the study were of high performance levels, chosen because they could achieve the difficult task of playing in the highest register on the saxophone. A fiber optic scope was inserted into the mouth in order to observe the placement of the tongue. While having a foreign object in the mouth would affect playing ability, the achievement of the highest notes with the scope placed in the mouth was argued to insure the validity of the results of the study. This study seemed to cast doubt on verbal directives for the physical placement of internal physiology as a sole strategy on a wind instrument. Players who were achieving the highest register often did so while doing the opposite of what they said they were doing with their tongue. If teachers tell students where to place internal structures the results may not be literally enacted. This means that verbal directives for anatomy may still be interpreted as a mental image and may elicit positive results anyway, as in this study when players achieved high notes while doing the opposite movement that they believed and said that they were doing. In that case, the verbal anatomical directive was functioning as a mental image, not a literal directive, and should be considered imagery.

Other writers described internal physiology in relation to various techniques. John Krell (1973) specified where in the mouth he believed the tongue should articulate. While telling someone where to place their tongue seems fairly straight forward, Trevor Wye (1983) described using the larynx and opening and shutting the throat to produce vibrato. Roger Mather (1989) also elaborated extensively on his preferred placement of the tongue, soft palate and uvula. While these directives may or may not have been effective taken literally or as images, the authors intended them to be enacted physically. The intention of physiological directives to be taken literally is how this strategy category is defined for the purpose of this study. Imagery is discussed as a separate category where teachers intend to create a mental image that is not based on concrete physical directives.

Verbal Description using Creative Visualization or Imagery

Other types of verbal instruction mentioned in the literature were not directive or focused on physiology. One form was imagery, in which creative visualizations were used to help direct an unseen aspect of flute technique. A compilation of the various approaches for teaching vibrato on the flute showed that many believed that vibrato could not be taught and was "purely a matter of expression and feeling" (Debost as cited in Toff, 1985 and in Lancaster, 1994). Such teaching only referred to artistic purposes for the creation of vibrato and employed language that was more poetic than literal. British flutist Geoffrey Gilbert claimed that vibrato should grow out of emotional aspects of music, and was a psychological process (Floyd, 1990). Vernon Hill (1995) directed students to mentally "picture" the vibrato they want to produce and to "will" it to happen.

Imagery/creative visualization has been applied to several playing techniques, for example as reported by James (2008) in the dissertation on the teaching of Jeanne Baxtresser, former principal flutist with the New York Philharmonic. Baxstresser asked her students to visualize a candle flame when learning vibrato. A flickering candle was used as a mental picture of the preferred sound of vibrato. Baxtresser was also reported to describe ideal vibrato as "spinning" from low to high notes. These phrases were not descriptive of flute technique in a physical way but instead evoked visual images of objects flickering or spinning in order to elicit some physical movement on the part of the student. The term "spinning" was also used by others to describe an ideal tone quality (Garner, 1998). Michel Debost taught vibrato by referring to its production as coming from the heart. He also made references to vibrato coming from the player's personality (Pintner, 1999). Alain Marion instructed students not to think about vibrato but rather to think about singing and human warmth from which the vibrato comes (Cohen, 2003). Language referring to tone included words like "round" (Greene, 1980). Other terms used that described negatives in tone quality were "dead" or "flat" (Greene, 1980). Some authors referred to aspects of flute tone, such as tonguing or sound quality, as the "bow" of the flute, alluding to the production of tone on string instruments (Krell, 1973; Peck, 1998).

The Use of Vocal or Speech Techniques

Teachers and authors occasionally made references to vocal and speech techniques when discussing the interior of the mouth and throat. Alain Marion, teacher at the Paris Conservatory, was reported to tell students to recreate the feeling of singing at the same

pitch when playing the flute (Cohen, 2003). Speech technique allusions included

recommending consonant or vowel enunciations, even though the vocal chords are not

activated when playing the flute.   Recommendations included the insistence of certain

syllables over others (Greene, 1980; Morris, 1991) or discussion of different syllables as

useful for particular effects in articulation (Bates, 1969: Krell, 1973; Hill, 1995). When

discussing articulation, references to speech syllables was commonly found. Instruction

on the correct placement of the tongue in order to enunciate the recommended syllables

was often left out, however several authors made determinations of syllable types by

referring to the language in which they were spoken (Bates, 1969: Cohen, 2003; Galway,

1990; Gilbert as cited in Floyd, 1995; Walker, 1995). John Krell, in his well-known

treatise on the teaching of William Kincaid, specified tonguing on the "ridge above the

teeth", where he says one would say the letters "t" or "d" (Krell, 1973). Another use of a

speech technique was in reference to creating vibrato. Several authors instructed students

to make pulses in the tone by saying "Ha-Ha-Ha" into the flute (Galway, 1990; Walton,

2005, Louke & George, 2012)).

The Walker study (Walker, 1995) elaborated on vocal schools in different languages

as they related to syllable pronunciation. Recommendations by flute teachers of tongue

shape, general tone resonance, as well as syllables used in articulation, were found in this

study to be more specific when vocal technique was used. Some teachers used discussion

of resonators (spaces inside the nose and mouth) or vowel shapes as in vocal pedagogical

practice recommending that vowel sounds be imitated in terms of mouth shape, or that

the nasal cavities be thought of as resonating to the pitch played on the flute (Mather,

1985). Many of these verbal instructions were discussed in relation to the topic of tone production and included detailed references to voice production even though the vocal chords are not activated when playing the flute (Mather, 1980-1989; Walker 1995). Walker referenced vocal pedagogical writings in the discussion of tongue placement and also used diagrams taken from vocal books in her study, as will be discussed below.

Visual Models

Another avenue of instruction found in the literature was the use of diagrams that showed the internal physiology involved in flute playing. These were used to inform the student about the teachers' preferred placement of internal structures such as the tongue or throat. One recent dissertation sought to apply principles of anatomy and physiology to playing the flute (Fain, 2009). A combination of verbal description of internal structures with illustrations of the internal physiology of the mouth, nose and neck were used in this work. Figure 2 accompanied the text on mouth and throat physiology.
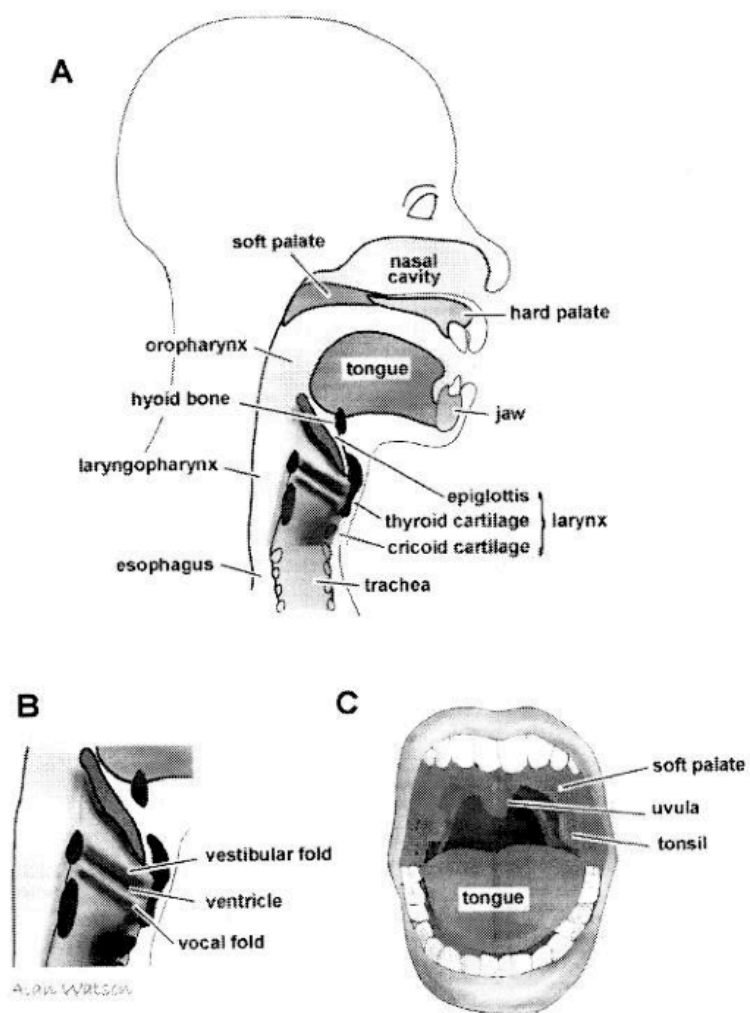
Figure 2:

Fain (2009)

From Watson, A. (2009). *The Biology of Music.* Lanham, MD: Scarecrow Press.

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The physiological directives discussed that were applicable to internal aspects of flute technique were vibrato and the size of the throat opening and oral cavity. The author discussed voluntary versus involuntary muscles and the common teacher directive to open the throat. The effectiveness of the directive to open the throat was not part of the study, rather physiological possibility versus impossibility was discussed. The author explained that vibrato is a function of rapidly fluctuating vocal chords, refuting the myth that vibrato could be created by the diaphragm, which is an involuntary muscle. Many flute and voice authors have erroneously claimed that vibrato was produced by the diaphragm (Berger, 1973; Bates, 1969, Greene, 1980; Gilbert as cited in Floyd, 1995). While there is still some disagreement on exactly how and where the vibrato is produced, recent models focus on muscles in the throat (Hirano, Hibi, & Hagino, 1995; Titze, 2002; Titze, Finnegan, Laukkanen, Fuja & Hoffman, 2008).

Detailed physiological diagrams taken from vocal pedagogical writings were included in the Walker study and the author proposed that they were relevant to flute teaching. These showed the internal cavities of the head and throat and also showed possible tongue shapes. These represented the idea that understanding vocal production could benefit flute playing, even though the air must be directed out of the mouth and not allowed to exit through the nose while playing the flute.

Tongue and tip positions for the vowels

(1) [i]   (5) [ɑ]
(2) [e]   (6) [ɔ]
(3) [ɛ]   (7) [o]
(4) [æ]   (8) [u]
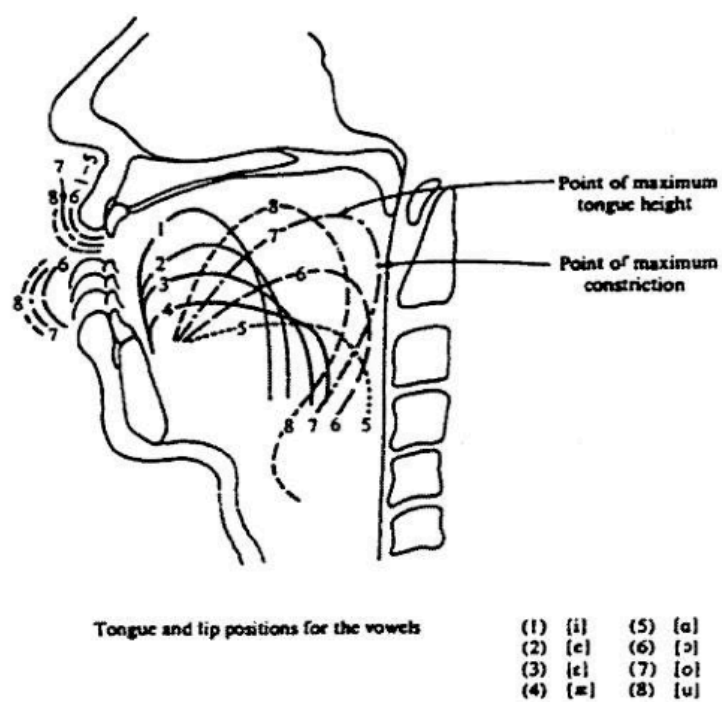
(a)

Figure 3: In Walker (1995)

Figure 4: in Walker (1995)

From MILLER. *The Structure of Singing*. 1E. © 1996 Wadsworth, a part of Cengage Learning, Inc. Reproduced by permission. www.cengage.com/permissions

Surprisingly few instructional method books, articles and other writings about flute playing included diagrams of the internal physiology relevant to flute playing. Occasionally a rendition of lungs, rib cage or a cross section of the mouth was included in texts on flute technique (Greene, 1980; Mather, 1989; Nyfenger, 1986; Walton, 2005;

Wilson, 1998). These took the form of diagrams of the inside of the mouth, tongue and

of the throat and lungs, showing the preferred placement of the tongue for various

articulations and tone qualities. This illustration from Nyfenger(1986), showed

alternative tongue placements for use during articulation.
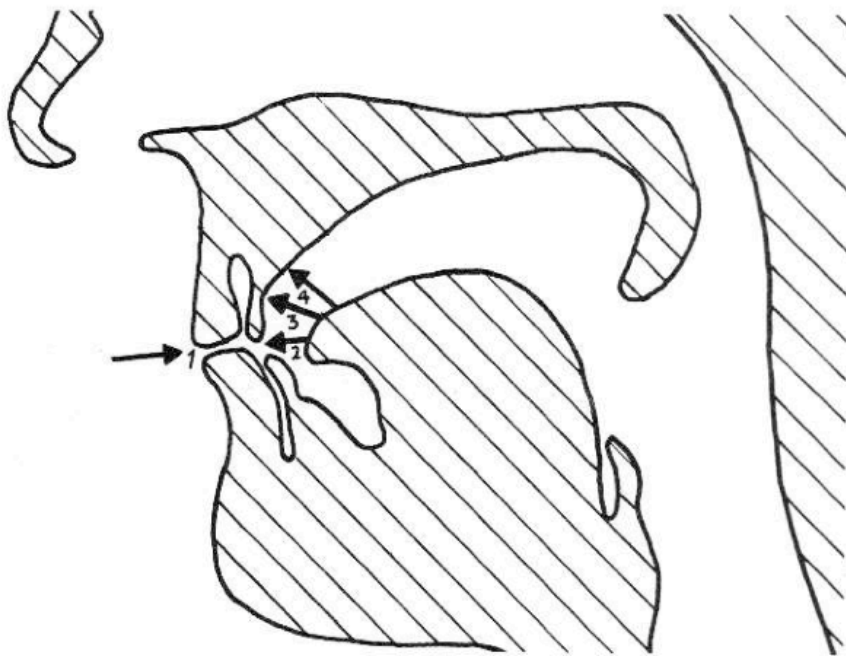
Figure 5:

Nyfenger (1986)

Used by permission of the rights holder, Paul Nyfenger GT Marketing, Ltd. Closter, NJ

Other types of illustrations in flute literature included pictures of objects or shapes that

were created to help visualize the action of an internal structure. Wye (1985) in his

method books used boxes to visualize lungs. Nyfenger (1986), in his book on the flute, used black lines to illustrate the resulting sound made from various types of tonguing.
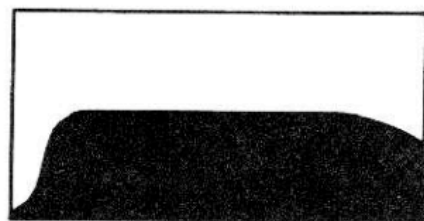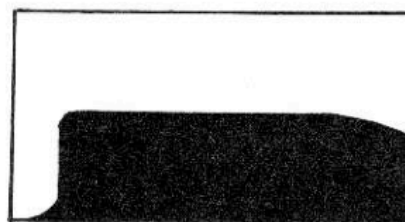
HOO!   TU.
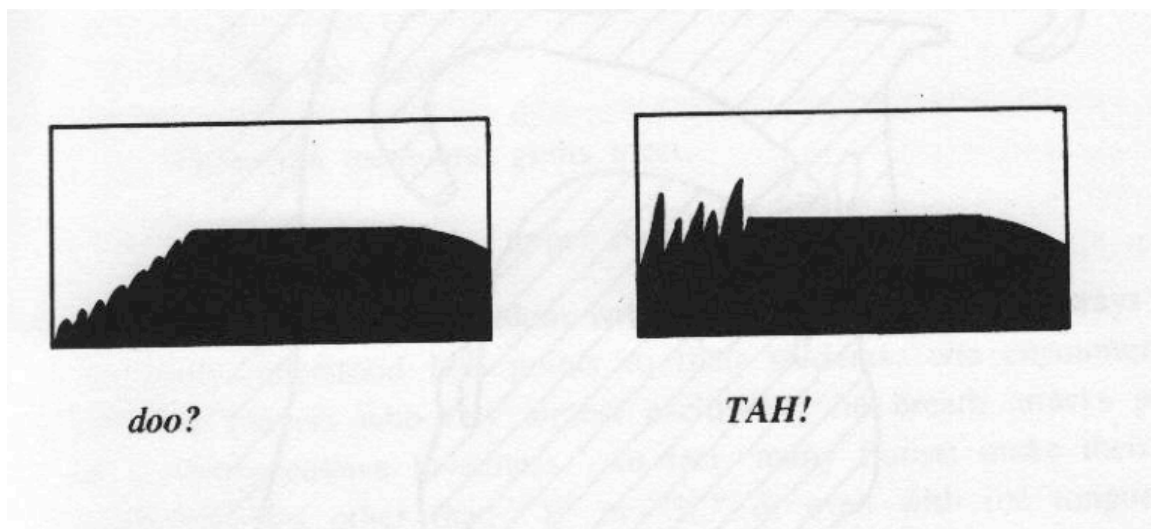
doo?   TAH!

Figure 6:

Nyfenger (1986)

Used by permission of the rights holder, Paul Nyfenger GT Marketing, Ltd. Closter, NJ
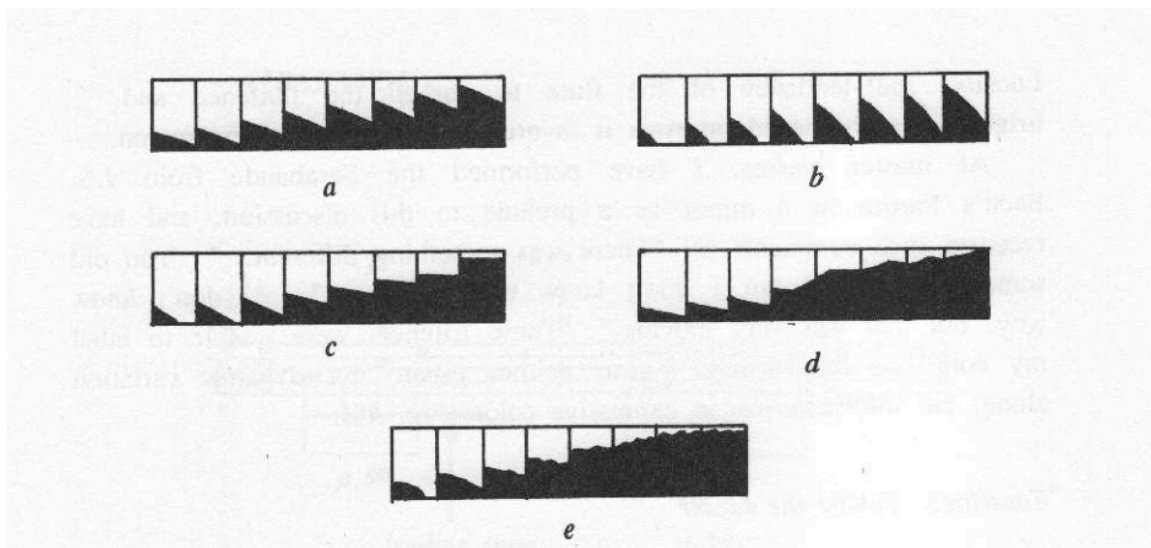
Figure 7:

Nyfenger (1986)

Used by permission of the rights holder, Paul Nyfenger GT Marketing, Ltd. Closter, NJ

Hill (1995) used undulating lines to help students visualize vibrato and shapes to visualize articulated notes. These are visual tools similar to creative visualization or imagery and do not address actual physiology nor do they direct students specifically in a physical way.

Teacher Modeling

Modeling has been found to be an effective teaching strategy, however it is not possible to visually observe teacher modeling when the skills demonstrated use internal techniques. Modeling, therefore, as related to the teaching of internal aspects of technique, can only occur as an aural example. While a teacher can perform an example,

the student is limited to imitation based on aural perception when modeling is used as a teaching strategy on its own.

Teacher modeling has been found to be a preferred method of music instruction in a study comparing it to guided or mixed method practices. (Rosenthal,1984). Generally speaking, teacher modeling in lessons is seen as positive and also as evidence of effective teaching (Duke & Simmons, 2006). While many music-teaching philosophies such as the Natural Learning Process are also based on teacher modeling as a preferred method (Kohut, 1992), no distinction in teaching strategy was defined within that philosophy regarding techniques for which there is no visual model available. Therefore, the student is left relying only on aural perception as a guide when aural modeling is used as an exclusive strategy.

The philosophy of Shinichi Suzuki relied on modeling and was originally used to teach violin and later applied to the teaching of wind instruments. A historical dissertation on the Suzuki flute method made little reference to internal techniques (Rea, 1999). As was central to Shinichi Suzuki's philosophy, excellent aural modeling was stressed. Only one verbal directive was mentioned in the dissertation concerning the throat, otherwise students were told to rely on aural modeling. This oversight in the use of Suzuki's method when applied to the flute is surprising. The success of the method on string instruments and piano was largely due to the visual nature of all techniques used to play those instruments.

Since the flute and other wind instruments use internal mechanisms to produce sound there is no way for students to learn by direct visual observation. Teachers of the flute have been shown to use aural modeling to teach internal techniques, however as a sole method its efficacy has not been studied. For instance, aural example without verbal instruction was the preferred method used by Julius Baker, former principal flutist with the New York Philharmonic (Ragusa 2004). While many of his former students have gone on to achieve prominence in their careers, his biographer was not permitted to do an analysis of his teaching practices. A dissertation on Michel Debost, professor at the Oberlin Conservatory, stated that he relied on aural modeling as his main teaching strategy but also used the strategy of verbal description regarding vibrato's creation in the throat (Pintner, 1998). Another preference for aural modeling was found in the Jean-Pierre Rampal and Alain Marion teaching traditions (both taught at the Paris Conservatoire) and was stated as a directive to "Focus on what you are hearing, not where your tongue is going." (Cohen 2003). Marion was also said to believe that if a person had good taste they would develop a good tone (Cohen 2003). Directives to "make each sound as beautiful as you can" and "Always concentrate on improving the sound", without instructions on how to achieve the desired sound, were found in the method book by Greene (1980). Trevor Wye (1980) recommended practicing long notes to improve tone, however he relied on a trial-and-error approach to achieve desired outcomes. He instructed students to play the first note until it was "really good" or "sounds beautiful" before moving on to the next note, which he said should sound "just as good". He said that a student should "Produce good result by *whatever means…*" (p. 33).

Summary

Study into teaching strategies in studio music teaching have defined general categories associated with effectiveness. General components identified as effective were associated with all instruments and were not studied as applied to individual instrumental techniques. Those studies' authors recommended that further study look specifically at teaching strategies that address particular instruments and techniques. A study into effectiveness in vocal teaching recommended further study into specific technical directives. In the area of flute pedagogy there have been many descriptive and comparative studies but none have been empirical in nature. Other descriptive literature exists on flute teaching in the form of books, articles and method books. Teaching strategies in the aspects of flute technique that are internal have been discussed in the literature pertaining to the following modalities: verbal description of physiology, creative visualization or imagery, teacher modeling, and the use of visual models. Comparisons with vocal technique used by some teachers fall into the categories of verbal description of physiology, references to speech, the use of visual diagrams and creative visualization/imagery. While there is evidence that all of these strategies have been used to address internal techniques, evaluation of the strategies for their effectiveness has not been done as of writing. Instead, authors made assumptions about the effectiveness of the techniques based on their historical use.

Chapter III

METHODOLOGY

Introduction

This chapter is a description of the research methods used to investigate the

effectiveness of teaching strategies addressing internal aspects of technique on the flute.

A discussion of the methodology includes the overview, research design, data collection

methods, discussion of limitations, participants, researcher positioning and analysis

methods. The issues of validity, transferability and ethical considerations are also

addressed.

Purpose of the Study

There is a need to know how teachers are currently teaching internal aspects of flute

technique and how effective these strategies are.   A descriptive study seeks to understand

and to give detailed account, perspectives and subjective account of new and familiar

phenomena (Roulston, 2006). A review of the literature outlined several categories of

strategies for teaching internal techniques on the flute, however current practice must be

examined to create a true picture of what is occurring in real life situations. There is a

need to explore, explain and describe current practice which points to the use of multiple

data gathering methods (Marshall & Rossman, 2006). Data in the form of a survey as

well as observation and interviews will reveal a more complete picture of the nature of

current practice. The researcher seeks an "emic or insider" perspective on the study of

strategies and their perceived effectiveness (Roulston, 2006). This is achieved because of

the expertise of the researcher in the area of flute performance and her understanding of the language and protocols of education in this area. Investigation into the effectiveness of teaching strategies for internal aspects of the flute sought to reveal players' ratings of the strategies' effectiveness in an effort to illuminate best practice.

Research Questions

1. What is the incidence of use of the following instructional practices in the teaching of internal flute techniques such as vibrato, throat and mouth shape, tonguing and tongue placement?

    Verbal Description

        Internal Physiology

        Creative Visualization/Imagery

        Vocal/Speech Techniques

    Visual Models of Anatomy

    Visual Representations/Pictures of Shapes, Colors or Places

    Teacher modeling with student imitation

2. How do flutists perceive the effectiveness of these strategies?

3. Are some strategies for teaching internal flute techniques perceived to be more effective than others?

4. What other strategies are being used to teach internal flute techniques?

Rationale for Mixed Method Design

The research questions and conceptual framework for the study pointed to methods of data collection that included both quantitative and qualitative information gathering. A pragmatic approach, as discussed by Bloomberg and Volpe (2008), is appropriate when the problem to be studied is best investigated using both quantitative and qualitative methods. This was the best procedure due to the need to include ratings of traditional strategies as well as investigations of newer strategies named by survey participants. While the nature of current practice could be seen in overview by using a survey, details of strategies that were not mentioned in the literature needed to be investigated qualitatively, since respondents were unable to rate new strategies' effectiveness in the survey. A survey can gain basic information about traditional strategies and the emergence of newer practice, but must be treated with skepticism and as only one method to gain information about people's views (Schuman, 2008). Observations were used to verify survey data on the effectiveness of newer strategies and to gain a deeper understanding of emerging practices. Validity was therefore sought by using more than one data collection source and by using mixed collection methods (Weirsma & Jurs, 2009).

The design for the qualitative part of the study was an investigation of strategies that stood out as newer, emerging or exceptional as a result of the survey data. While information about current practice and the participants' rating of the effectiveness of the traditional strategies was learned through the survey, the study also left room for the

discovery of new strategies and for focus on any notable use of strategies. The observations and interviews of focused case studies gave an opportunity to further explore, explain and describe the phenomenon of the exceptional or unique teaching strategy (Marshall & Rossman, 2006). Observations of the newer strategies and discussion with participants gave a base of knowledge and lent greater depth to the study than would have been possible through a survey only. The need to describe newer practices and add them to the scholarly body of literature on flute teaching was the reason for assuming a pragmatist approach for the research design. The flexibility of research design, allowing for multiple data collection and analysis methods, was seen as the most appropriate way to approach the study (Bloomberg & Volpe, 2008).

Rationale for Survey Method

Surveys are a useful method for information gathering because they are free from the effects of context and interview effects (Schuman, 2008). The use of a cross-sectional survey method is beneficial in its access to a larger geographical sample. Also, by increasing the size of the pool, issues of local adherence to schools of thought would hopefully be minimized. The larger pool also could potentially draw on participants from other countries, further broadening the applicability of the study to multiple cultures and schools of teaching. Validity and generalizability of the study was sought by using multiple data collection methods. Also, in a survey, the anonymity of respondents lessens the respondents' fear of reprisal caused by disagreement with teachers who may have power in the areas of grades or job hiring (Marshall & Rossman, 2006). A survey instrument could also lessen the researcher's influence on the study. The use of a scaled

answer area in the survey could yield more subtle data results in regards to participants'

preferences for teaching strategies. This survey ratings on effectiveness were measured

based on the attitudes and beliefs of respondents, and would therefore be considered

subjective reporting (Schuman, 2008).

Rationale for Observations and Interviews

The use of observations and interviews as a second part of the study was an

opportunity to gain depth of information about particular teaching strategies. In order to

explore and describe novel, unique, exceptional or notable examples of strategies to teach

internal techniques, it was most useful to observe the strategies in usual settings

(Marshall & Rossman, 2006). One of the guiding hypotheses of this study was that there

were strategies being used to teach internal aspects of technique that had not been

mentioned in the literature, and that in addition to observations, in-depth interviewing

was a useful method for guiding an inquiry into these areas (Marshall & Rossman, 2006).

Participants who were willing to be observed and interviewed were able to give more

depth of knowledge about new, unique or exceptional strategies and to give greater

information about the strategies they believed to be effective than were observations

alone. This part of the study was a collective case study of flutists engaged in particular

strategies for teaching internal aspects of flute technique. This was an extension of the

instrumental case study method, in which the researcher seeks to focus on a specific issue

(Roulston, 2006). Observations and interviews were coded for emerging themes, in the

categories outlined in the conceptual framework and for new strategies studied in the

course of this research. The qualitative section of the study on strategies that were not

found in the literature was a beginning investigation into their nature and into users'

effectiveness claims.

Research Sample

The sample for both parts of this study was deliberately recruited. Research

participants were flutists over the age of 18, who were either enrolled in a music

performance major on the flute at a college or university, or were currently working as a

professional performer or teacher of the flute and had gained a degree in flute

performance. Because the study sought information about teaching strategies addressing

internal aspects of flute playing, the sample needed to be restricted to those who had

sufficient experience to answer questions, assuming they had studied with at least two

teachers and had achieved a high level of performance, as defined by admission to or

completion of a flute performance degree. Non-student participants were specified to be

graduates of similar institutions as a way of ensuring high levels of playing standards in

all respondents. Participants self-qualified in a forced-answer at the beginning of the

survey, specifying their education levels.

The pool of participants in the two parts of this study differed by geographical

distribution. Part one, the survey instrument, was online and advertised through the

various flute clubs, national and international flute associations and through word of

mouth. Respondents potentially could have been from anywhere that had internet access.

The researcher's memberships in the College Music Society, New York Flute Club, New

Jersey Flute Society, National Flute Association and New Zealand Flute Society were

avenues for seeking participants, as well as the international flute electronic mailing list run through Syracuse University. Members of these societies and flute groups in Australia and the United Kingdom were also contacted to recruit participants from these countries.

The sample available for in-person interviews and observations were limited geographically, however conferencing software, Skype and the telephone gave a greater potential participant pool. Strategies that were unique, exceptional or new were prioritized for interviews and observations. Respondents who answered positively to a survey question requesting interest in being observed or interviewed were followed up. The researcher then made contact with the participant and scheduled observation and interview sessions based on mutual availability.

Test Pilot and Terminology Checks

Terminology choice was discussed with approximately 20 flute students and professionals in the New York area in January 2011, who made suggestions of words to describe internal techniques. The discussions took place at a flute class at New York University, where approximately 12 flute students were asked what words they would use to describe internal physiology and techniques. The flute students studied with many different teachers and approximately a third did not use English as their first language. Most feedback and suggestions came from the native English speakers, particularly those who were graduate student. Terminology was also discussed casually with other flute professionals in the New York area who were in agreement with the suggestions of the students. The researcher followed the consensus of the group where there was a clear

majority reference. For other descriptive language where there was no consensus the researcher used various terms interchangeably in different questions of the survey. A test pilot of the survey took place in January 2011, involving approximately 20 professionals and students in the New York area. The participants made suggestions about the survey software, leading the researcher to change from the Teachers College survey tool to Survey Monkey because the Teachers College survey tool often did not work for pilot participants. Wording was reported to be understandable, so no changes were made other than a change to Survey Monkey.

Overview of Information Needed

The information needed in this study was based on the research questions:

1. What is the incidence of use of the following instructional practices in the teaching of internal flute techniques such as vibrato, throat and mouth shape, tonguing and tongue placement?

> Verbal Description
>> Internal Physiology
>>
>> Creative Visualization/Imagery
>>
>> Vocal/Speech Techniques
>
> Visual Models of Anatomy
>
> Visual Representations/Pictures of Shapes, Colors or Places
>
> Teacher modeling with student imitation

2. How do flutists perceive the effectiveness of these strategies?

3. Are some strategies for teaching internal flute techniques perceived to be more effective than others?

4. What other strategies are being used to teach internal flute techniques?

In order to gain information relating to question 1, the survey included several types of questions. Open-ended questions were asked to elicit information about strategies not found in the review of the literature. Scaled answers were also sought concerning the effectiveness of teaching strategies based on the categories found in the review of the literature and concerning an open category titled "other methods". The researcher sought respondents from the United States, New Zealand, Australia and the United Kingdom through contacts with the various organizations listed above. Participants in the survey were able to suggest participants for observations or interviews. The observations and interviews sought detailed information about unique or exceptional teaching strategies, particularly about strategies in the survey category marked "other".

Overview of Research Design

The design for this study was mixed-method beginning with a survey instrument and progressing to observation and interviews. The survey included open-ended questions and scaled questions. Observations and interviews were in the form of multiple case studies of teachers and students who were employing exceptional or unique strategies, which were coded for emerging themes. The subjects for interviews and observations were teachers and students who were employing unique or exceptional teaching strategies for teaching internal aspects of flute technique. Observations and interviews of each

participant were sought, however some participants were only available for interviews. Data was collected as field notes, audiotape, as consented to by participants, which was transcribed and coded. Participants crosschecked the researcher's notes and transcribed recorded interviews. Colleagues in the fields of flute performance and teaching member checked notes and draft findings.

Literature Review

The review of the literature informed the research questions and was conducted before the selection of methodology. A review of studies into effectiveness in music teaching, on flute teaching and of instructional literature about flute playing resulted in categories of teaching strategies. These categories were a beginning framework for this investigation into effectiveness in teaching strategies for internal aspects of flute technique. Literature was accessed from the researcher's personal collection gained through coursework, through online sources at the Teachers College library, including Digital Dissertations, ProQuest and other journal searches at Sage Publications. Flute resources were accessed through library and periodical searches. The researcher's private collection of books, methods and periodicals was also utilized.

Data Collection Methods

The survey gathering of data was done through the web-based Survey Monkey between April 2011 and April 2012. Data collected through interviews and observations was in the form of field notes and tapes with the consent of participants and occurred in

2012. Notes were coded for emerging themes and content regarding the newer strategies nominated in the survey.

Data Analysis Methods

The survey data on preferred strategies were analyzed and presented through tables showing the breakdown of answers by category. Total answer numbers and percentages for the teaching strategy categories were reported. Simple coding categories were made using the strategy areas found in the literature review and displayed in the conceptual framework. Colors for each strategy category were assigned with numbers used for each strategy within those categories. Other methods to be determined in the study were coded as either a method or a device. Coding and field notes from interviews and observations were analyzed for relevance to the research questions and the results crosschecked and member-checked. As new strategies were added by participants in the survey they were grouped according to the strategy category they best fit. A new strategy category was created as a result of the findings, which was then represented in the completed conceptual framework.

Trustworthiness

Issues of trustworthiness were addressed in this study and were linked to data collection methods, researcher knowledge of the field and transferability of results to other related fiends. Data collection for this study was mixed-method, combining the findings of survey instruments with observations and interviews. The results of the

survey instrument on teaching strategies and their effectiveness were enhanced by qualitative data gathered in the second part of the study.

Researcher Positioning was addressed in the choice of methodology. The survey instrument is an impersonal method for gathering data and is not subject to interpretation as is possible in qualitative methods. Participants nominated themselves or others for the qualitative part of the study, and this may have lessened the impact of researcher bias. Also, the researcher had experiences of many teaching strategies and although she had personal preferences, the survey sought to address this bias with a random placing of survey questions relating to teaching strategies. Terminology was decided based on consensus of flutists interviewed during the pilot test and clearly preferred words were used. Also, alternative words describing strategies where there was no consensus in the pilot were used in different question areas of the survey to minimize the risk of participants misunderstanding concepts. It was hoped that any researcher bias towards preferred methods was minimized. Crosschecking by other flutists and non-flutists was also used to minimize researcher bias.

Interview protocol was developed that was topical in nature and was structured by the researcher to keep on topic. Accuracy was checked as data was crosschecked by the participants and member checked with colleagues in the music education field. The researcher engaged in constant self-reflection in order to minimize possible researcher bias toward the results and crosschecked conclusions with interviewees and colleagues. Transparency was addressed by engaging in participant checking. The researcher

allowed participants and interviewees to read field notes, listen to taped interviews and make necessary corrections in transcriptions (Rubin & Rubin, 2005). Also, participants were allowed to request that their statements be edited for formality, which occurred once. Allowing participants to check the data and findings ensured that the study's findings did not reflect the researcher's bias or prejudice (Marshall & Rossman, 2006).

Transferability of the study could be possible and the findings may potentially have practical value in other domains of music education. There are many other wind and brass instruments that have elements of internal technique. It was hoped that the findings about the effectiveness of teaching strategies to address internal aspects of flute technique will have some transferability to those other instruments and lead to further understanding and improved practice in other disciplines (Marshall & Rossman, 2006).

Limitations of the Study

Survey methods have limitations, including their dependence on question wording and the definitions proposed in the questions (Schuman, 2008). It was hoped that the inclusion of open-ended questions and questions with different terminology would help to address this limitation. A trial run of the survey after feedback from flutists on terminology helped to ensure understandable wording. Recruiting sufficient survey respondent numbers was known to be challenging and this was addressed by using an online survey accessible from an invitation email. The survey was intended to take no more than 15 minutes for participants to complete.

The second part of the study was limited geographically (for in-person observation and interviews) to the New York Metropolitan Area. All other observations and interviews were done using computer conferencing software, Skype or telephone. Another limit inherent in observations and interviewing was that the participants may have reacted to the researcher or tape recorder, thus influencing the data collected. The act of observation can obscure the data and this was addressed by the researcher outlining the purpose and scope of the research for participants and by defining the researcher role as non-authoritative to students involved in the study.

Previous Related Study

A related mini study on innovated teaching methods on the flute was conducted in the fall of 2009. This study was conducted at an Eastern United States university and its purpose was to examine innovative teaching strategies. The methodology of the study was qualitative and included taped observations of lessons and flute master classes, and recorded interviews of three students who were music performance majors in those classes. The study employed video recording of the observation and audio recording of the interview sessions with later coding by the researcher for content. One of the main innovative teaching areas found involved copyright infringement, the reporting of which became a risk to the participants. For this reason and the difficulty found in defining innovative techniques, the researcher's focus was amended after the study to the present topic. The study did however gain rich information about the nature of the techniques discussed by students. Researcher positioning was also positively addressed regarding students mistakenly perceiving the researcher as an authority figure. Experience in

gaining the participants' trust was gained by the researcher through addressing student's perceptions. The researcher found that it was important to clearly articulate the lack of authority she had in the students' education because the researcher's age and status was initially confusing to students and caused them to behave in submissive stances until the researcher outlined her equal status with them. Interviewing techniques were also honed in this and previous work related to research into sex-stereotyping in instrument selection, as part of a research course taught by Dr. Harold Abeles at Teachers College, Columbia University. The researcher had experience in choosing appropriate settings for interviews, framing of questions, allowing for authentic answers by managing silence and researcher comments, and respect for anonymity.

Summary

This study was conducted with a mixed-method design comprising a survey, interviews and observations. The survey used questions on the teaching strategy categories that were found in the review of the literature and asked for flutist's rating of those strategies and for information on unique or exceptional strategies. Participants were able to volunteer to be observed and interviewed or to suggest flutists for inclusion in the study. Observations and interviews targeted participants who named strategies that were not found in the literature, in order to gain information about the strategies and to examine the effectiveness claims of those methods.   It was intended that the combination of data gathering methods led to greater knowledge about effective teaching strategies that were used to teach internal aspects of flute playing.

Chapter IV

RESULTS OF THE SURVEY

Introduction

A survey, conducted online through Survey Monkey, was run to gain data addressing the research questions. While the first three questions were addressed in the survey, question four was partially addressed through participant's naming of innovative or exceptional strategies. These strategies were then investigated in part two of the study and are reported in the following Findings chapter. The research questions that the survey addressed are restated below.

Research Questions

1. What is the incidence of use of the following instructional practices in the teaching of internal flute techniques such as vibrato, throat and mouth shape, tonguing and tongue placement?

   Verbal Description of:

       Internal physiology

       Creative visualization/imagery

       Vocal/Speech techniques

   Visual Models of Anatomy

   Visual Representations/Pictures of Shapes, Colors or Places

Teacher Modeling with Student Imitation

2. How do flutists perceive the effectiveness of these strategies?

3. Are some strategies for teaching internal flute techniques perceived to be more

    effective than others

4. What other strategies are being used to teach internal flute techniques?

The survey of teaching strategies that were found in the literature was run on Survey Monkey from April 2011 until April 2012. The survey is displayed in Appendix B. Short articles about the study and requests for survey participants were published in May of 2011 in the New Jersey Flute Society online newsletter, and in the New York Flute Club Newsletter, which is a paper-only publication. A request for participants in the survey was sent in May 2011 to the international flute electronic mailing list from Syracuse University, managed by Larry Krantz. The electronic mailing list allows one request per subject area, however a request for follow-up participants for part two of the study was made later in 2011. The researcher also contacted flutist colleagues in the United States, New Zealand and Australia and asked them to participate and to forward the request to their students and others. In June, 2011 the researcher wrote to contact addresses of other United States flute clubs, using addresses listed on the National Flute Association website. Of the approximately 25 emails requests sent out, two responses came back. Multiple notices of failure to deliver the email came back which showed that the National Flute Association address list was unfortunately inaccurate. In October of 2011, the College Music Society, after having reviewed the survey, invited its flute-teaching members to participate, resulting in a large additional number of respondents.

Respondent numbers were highest after the initial invitation was published in the New

Jersey Flute Society Newsletter and the New York Flute Club Newsletter in April 2011,

and then after the College Music Society sent invitation letters to all flute faculty

members in October 2011. Other respondents participated in the survey at other times,

but due to the anonymous nature of the survey it is unknown whether they were late

respondents from the other invitations or if they were responding through other

notifications.

Survey Results

The total number of respondents who started the survey as of April 16, 2012 was 160.

The percentage of respondents who agreed to the consent statement was 98.10 %, or 156

respondents. The number of respondents who were over the age of 18 was 99.40 %, or

154, the respondents younger than 18 were not allowed by the survey instrument to

continue participating. Respondents who were professional flutists who had majored in

flute performance represented 90.50% (133) and students currently majoring in flute

performance represented 9.50 % (14) of the total population. The low percentage of

student participants had not been anticipated. Responses after the consent and age

choices were not forced by the survey instrument, so rates of participation varied for each

question.

Respondents' Exposure to Teaching Strategies

Question 4 answered research question number one by asking respondents to report if

they had exposure to the teaching strategies that were found in the review of the

literature. All strategies had been experienced. The most experienced strategies named

by respondents were those of teacher modeling, verbal descriptions of internal

physiology, vocal/speech techniques and imagery/creative visualization. Research

question four was addressed in this part of the survey, where participants were asked if

they had experienced the use of devices or other methods not listed in the survey. The

least experienced of the strategies was the use of devices, followed by the use of visual

models of anatomy. The responses in numbers and percentages are represented in table

4.

Table 4

Strategies Experienced by Flutists

Strategies Experienced in Order	Response Percent	Response Count
Teacher Modeling	97.80	131
Verbal Description Internal Physiology	93.30	125
Creative Visualization/Imagery	88.10	118
Vocal/Speech Techniques	79.90	107
Visual Representations/shapes, colors	61.90	83
Visual Models of Anatomy	55.20	74
Use of Devices	49.30	66
Other Method	14.90	20

Other Methods: Open Ended Question Responses on Other Methods Experienced

The participant-named strategies that had not been found in the literature search were sought under the categories of devices and other methods. The definition of the word "device" was not given to participants and so responses varied considerably from commonly used practice aids such as metronomes to unusual devices such as medical equipment.

Open-Ended Responses on Other Methods Experienced

The statements of respondents in which they named other methods and devices are quoted below exactly as stated on the survey.

Use of software to analyze tonal spectrum

Teaching HAH for the flutist to learn to separate the vocal folds. Using various vowel sounds to shape the tongue which affects the angle of the air stream Use of pinwheel to measure speed of air Use of tuner to check even air as well as intonation Use of post-its on the embouchure plate to chart movement of air. Use of hand to feel air stream and to discover where it is Use of mirror, video camera, iPhone, voice recorder (2 speeds)

Executing airstream and articulation without flute

vowel sounds

Have used Body Mapping and Alexander Technique as well, which are very specific uses of verbal description of internal physiology that also include a philosophy of approach to learning.

harmonics; lip flexibility exercises; foreign language sounds; metronomic pulsing

The Force, seriously!!!

Singing while playing

loud/soft- concrete suggestions

different syllabi like loe instead of toe - or yoe instead of goe

Sorry- no other teaching technique, but I wanted to mention that in addition to flute performance, I also have a degree in music education from the Crane School of Music. I think this is important to mention as I have discussed and researched teaching techniques as part of my schooling, something my colleagues who don't have ed degrees haven't done. I think it's why I'm a very good problem solver for my students. But back to the survey....

Whistling techniques Demonstrations of Inuit throat singing

Some physical activities (body awareness/body movement) as well
Indirect procedures or principles based in Alexander Technique

Plastic bag on the end of the headjoint. When the student vibrates or tongues, the bag will bounce up and down. Seeing the bag bounce helps students develop control. Sometime I place post it strips on the outer edge of the embouchure hole. They will bounce with the vibrato cycle. Lots of others tricks too.

Blowing air on our own hands/wrists to understand how lip position affects the direction of air or to understand the difference between warm and cold air.
tonguing: spit rice (Suzuki tonguing) vibrato: using HAH HAH HAH or EH EH EH to vibrate vocal folds. played "rough" then "smooth" or "slurred" to form the vibrato
Rice for tonguing, balloons for breathing, etc.

Physical modeling--connecting the sound with a moving hand, like watching flute vibrato to pretend-playing vibrato on a violin.

Telling students to yawn in order to lift the soft palate.

spectral analysis

pneumo-pro breathing bag

Breakdown of Categories for Open-Ended Responses

Some of the strategies given could be included in traditional categories. The

respondents' above-named strategies are broken down into categories in table 5:

Table 5

Open-Ended Responses on "Other" Strategies Experienced in numbers

Devices	5
Vocal/Speech technique	8
Imagery/Creative Visualization	1
Other method	10

Devices Listed in Categories

Participants named devices that were not found in the literature, although rice was

mentioned in Suzuki and other literature. The devices listed as experienced by

participants in the first open-ended question are listed in table 6:

Table 6

Devices Experienced as Listed by Respondents in Open-Ended Question 1

Spectral Analysis Software	2
Pneumo pro/Pinwheel	2
Breathing Bag/ balloons/ Plastic Bag	3
Post-it strips	1
Rice	2
Mirror	1
Video Camera/iPhone/Voice Recorder	1
Body Awareness/Alexander Technique	2

Recording Devices

While the metronome has been in common use for the last century as a rhythmic aid, recording devices used for private practice have become common only in the last several decades. Reel to reel players of the mid 20th century were cumbersome and were replaced by cassette players in the 1970s. Video cameras became more practical than home filming also in the 1970s. Recently iPhones have included video recording devices as well as recording ability, metronomes and other software.

Other Devices and Strategies

Other devices listed in this section of the survey were: "pneumo-pro breathing bag," rice to spit for the practice of tonguing, a bag, pinwheels, a mirror and post-it strips. Strategies that were physical in nature included blowing onto the wrist to practice air direction, the Alexander Technique, Body Mapping, whistling, body movement and awareness and what a respondent called "physical modeling" in which a player watches a hand make a movement such as creating vibrato on a string instrument. Also named was a strategy called "Spectral Analysis." These strategies, as well as those listed in the other open-ended question responses later in the survey, became the basis for part two of the study, in which strategies not found in the review of the literature were investigated.

Responses for "other method" were analyzed and it was found that many strategies described by respondents were already included in the survey. Examples included syllables for practicing vibrato (vocal/speech technique) and telling students to lift the soft palate (verbal description of physiology and a vocal technique). The statements types and their categories are shown in table 7:

Table 7

Responses of Strategies Experienced as "Other" that were included in named Survey

Strategies

_____

Vocal/Speech Techniques	8
Imagery/Creative Visualization	1

It was also found that some strategies named by participants were actually practice

methods, such as playing harmonics, playing loud and soft. Others mentioned the lips

(external flute technique) so were not considered for inclusion in this study. Statements

that were not understood by the researcher were not included for consideration to be

studied further, such as "The Force, seriously!" and "metronomic pulsing."

Detailed Questions on Exposure to Strategies

The next section of the survey, questions 6-12, contained detailed questions on

respondents' exposure to strategies and sought to clarify more specifically what

respondents had experienced by using more descriptive language in the questions.

Response percentages were as follows: In the area of visual models of anatomy, the

simple question elicited a response of 55.20% reporting having experienced this strategy,

while the more detailed question elicited 59.50% having experienced this strategy.

Visual representations/pictures of shapes, colors or places elicited 61.90% and the

detailed question elicited the same percentage. In the area of verbal description of internal physiology, 93.30% reported that they had experienced this strategy in the simple question, while 96.80% reported that they had experienced this strategy as a response to the detailed question. Creative visualization/imagery was experienced by 88.10% in the simple question, 93.70% in the detailed question response area. Vocal/speech techniques were experienced by 79.90% of respondents as stated in the simple question area and by 99.20% in the detailed question response area. Teacher modeling had been experienced by 97.80% of respondents as stated in the simple question response area, and by 99.20% in the detailed question response area. Devices were experienced by 49.30% in the simple question area, and 53.60% in the detailed question area in which "other" strategies were included. "Other" strategies were experienced by 14.90% in the simple question area, and because this area was combined with devices in the detailed question area, the percentage was 53.60% and was found to include strategies that had indeed been listed in the survey.

The next open-ended question asked respondents to name other strategies they have used to improve tone, tonguing or vibrato. This question sought to answer research questions 2, 3 and 4.

2. How do flutists perceive the effectiveness of these strategies?

3. Are some strategies for teaching internal flute techniques perceived to be more effective than others?

4. What other strategies are being used to teach internal flute techniques?

The open-ended responses on "other" strategies used to improve tone, tonguing and vibrato are copied here:

Body Mapping and learning proper use of the body through Alexander Technique have been particularly useful. Just learning to get in balance and not thrusting my jaw forward to make octaves and third registers and not pushing my head forward made a remarkable change in my playing (and that of my students) ease and freedom of tone and ability to make fine adjustments in tone and resonance.

Teaching HAH for the flutist to learn to separate the vocal folds. Using various vowel sounds to shape the tongue which affects the angle of the air stream Use of pinwheel to measure speed of air Use of tuner to check even air as well as intonation Use of post-its on the embouchure plate to chart movement of air. Use of hand to feel air stream and to discover where it is Use of mirror, video camera, iPhone, voice recorder (2 speeds)

Tone: The development of nasopharyngeal (sp?) muscles to reduce the amount of air leaking through the nose while playing. This was done by submerging one's head in a bucket of water for short periods of time whilst controlling the amount of air that was expelled out of the nose.

use of breathing bag, tube with ping pong ball

Exercises assigned

Coaching of melodies, especially opera melodies; listening to recordings of great performers, especially flutists and singers.

Physically placing hands on student- rib cage, etc. to encourage resonance of sound, etc.

listening to recordings; playing along with recordings; playing with a drone

Spectrum analyzer for tone quality study. Used to correlate subjective terms (light, dark) with actual spectral content.

Becoming the music

Sheet music etudes & exercises; YouTube and recording modeling; written descriptions in books (method books as well as other books)

Listening to other flutists on recording and in concert.

I have my students imagine that the air moving through the flute is actually water. I can then say the water is only filling up 1/3 of the tube, or it's dribbling out and it needs to gush out, etc. It seems to work well with younger students and as the air quantity or velocity increases, the tone quality improves.

Exercises with balance and support through the back to liberate the facial and mouth tensions to open the sound and vibrato. Also use of historical tonguing technique.

Targeted exercises that break down into working on a single concept

Tongue assisted embouchure (buzzing) Whistle Finger breath Breathing bag

Breath, listening, feeling, becoming aware of sensations, immersion in musical style

recording devices for instant digital feedback, both visual and sound.

buzzing, finger breaths, body positions (such as monkey, slouching, leaning against a wall, twisting)

Rather than being shown drawings of shapes, I have been told to think of a certain shape for my tongue or mouth to be in to produce a certain effect.

Practicing vibrato and tonguing in "chunks"

listening to other instrumentalists or singers

Vibrato - use of metronome, and of John Wion's website (with examples of vibrato slowed down 300%).

coordination of breath, air speed and shape of aperture

More Strategies Experienced by Respondents

The detailed questions in this second section of the survey elicited higher percentages of respondents reporting that they had experienced devices and other teaching strategies than in the first open-ended question on this subject. In this second open-ended question more devices were named. The breakdown of response categories is shown in Table 8:

Table 8

Other Strategies Experienced used to Improve Tone, Tonguing or Vibrato; Second Open-Ended Question

Devices	11
Other	4
Strategies Already listed in Survey	11

Devices

Recording devices and metronomes were mentioned as well as the use of recordings on the web, which were used as teaching examples. Imitation of other vocalists or performers was categorized under devices and modeling, although the model was not the flute teacher as had been the case traditionally in studio teaching. All of the previously mentioned strategies from the earlier question were again named in this response area. The additional devices listed in this open-ended response were: tube with ping-pong ball

(also called the Breath Builder) and a spectrum analyzer. A technique called a Finger

Breath, or a whistling finger breath was named. The mention of a technique where one

places their head in a bucket of water was ignored. Other responses that were in fact

practice techniques included directives to assign exercises, practice music in "chunks,"

and to coordinate the breath, air and aperture (embouchure). The strategies named as

well as the devices and their use will be discussed in the findings chapter, where

observations and interviews on the strategies were conducted.

Strategies with a Rating of Most Useful

The next part of the survey sought to find out which of the strategies were considered

by respondents to be most effective. This was done to seek answers to research questions

2 through 4.

2. How do flutists perceive the effectiveness of these strategies?

3. Are some strategies for teaching internal flute techniques perceived to be more

effective than others?

4. What other strategies are being used to teach internal flute techniques?

The initial general question on effectiveness, number 14, asked which strategies were

most useful for addressing internal aspects of flute technique. The responses in numbers

and percentages are shown in Table 9:

Table 9

Strategies Reported Most Useful

_____

<u>Most Useful Strategies</u>	<u>Response Percent</u>	<u>Response Count</u>
Imitating the teacher's example	83.80	98
Vocal/ Speech Techniques	82.10	96
Verbal Descriptions Internal Physiology	69.20	81
Imagery/Creative Visualization	59.80	70
Diagrams of Internal Physiology	26.50	31
Devices or Equipment	24.80	29
Evocative Pictures	20.50	24
Other strategy	12.00	14

_____

Open-Ended Responses for "Other" Strategy rated Most Useful

The next open-ended question in which respondents were asked to name "other" strategies that they found to be most useful for teaching internal aspects of flute technique sought to answer research question 4:

4. What other strategies are being used to teach internal flute techniques?

The answers given by participants to the open-ended question are copied blow:

It is a combination of the above that works, not one single technique. Also what works for tonguing is different for vibrato, so for me to answer this question, I would answer differently depending on whether it is vibrato or tonguing

My own physical exploration in practice and also the use of exercises invented by my teachers.

audio recording

Physically placing hands on student in important places for support, etc.

playing with a drone; playing with a tuner; LISTENING

Anatomy and voice technique books.

Listening to examples of vibrato and copying them. This website has been really helpful for my students: http://homepage.mac.com/johnwion/vibrato.html

Listening to artist performers on all instruments/voices

go to a "new" place in your brain to learn - makes change easier

Once the student has the concept down, I write little pictures on their music where they need reminders to reinforce during the week. For example, when ascending to a high note, in order to counter balance the tendency to clench, I write a (pretty laughable) picture of open teeth at the beginning and midpoint of the run. This helps reinforce what they know when I can't be there to remind them.

Larger body involvement in support and direction of air and vibrato development

Breaking down the concepts into part-whole -part strategies

listening to the sound of the inhalation to draw conclusions about the internal physiology of the student's mouth/throat.

listening - obvious, but often overlooked

buzzing, finger breaths, body positions

Practicing tonguing and vibrato in chunks, changing shape of inside of mouth to different vowel sounds to change tone quality.

spectral analysis

Responses to this question are broken into categories of "other," devices and strategies already included in the survey in Table 10:

Table 10

Response Categories for Other Method Most Useful in Teaching Internal Aspects of Flute Technique; Open-Ended Question number 3

Devices	3
Other	7
Strategies Already in Survey	9

Devices named as most useful were a tuner, spectrum analyzer and recording devices. Other strategies listed as most useful were placing hands on the student, larger body involvement, body positions, "Finger breaths," "Buzzing" and listening to the sound of

inhalation. The strategies from the survey that were named included listening

(modeling), going to a "new place in the brain" (imagery), vocal/speech techniques,

drawing pictures in the music (visual models of shapes, colors, places), and using

anatomy books (visual models of anatomy). Practice techniques named were breaking

down the music into parts, using exercises (not given by the respondent), and personal

exploration.

Rating the Effectiveness of Strategies addressing Internal Aspects of Flute Technique

The next question, number 16, asked respondents to rate the effectiveness of teaching

strategies for all internal aspects of flute technique, using a five-point scale ranging from

negative effect, not effective, no opinion, somewhat effective to very effective. No

respondents to this question reported here that any of the named strategies created a

negative effect. In Table 11, respondents' ratings are shown in percentages ranging from

not effective (NE), no opinion (NO), somewhat effective (SE) to very effective (VE).

Highest percentage answers are displayed in bold for each statement.

Table 11

Ratings on Effectiveness of Strategies

	Responses in Percentages			
	NE	NO	SE	VE
Visual Models				
Diagrams of internal structures	7.70	29.10	**50.40**	12.80
Pictures evoking desired sound	17.10	29.90	**36.80**	16.20
Verbal Description				
Internal Physiology	1.70	5.90	**57.60**	34.70
Imagery/creative visualization	6.80	13.60	30.50	**49.20**
Speech/vocal technique	0.80	5.10	25.40	**68.60**
Teacher Modeling	0.80	2.50	23.70	**72.90**
Other				
Devices/equipment	9.70	**40.70**	27.40	22.10
Other	0.00	**71.20**	9.10	19.70

(NE), no opinion (NO), somewhat effective (SE) to very effective (VE):

The three strategies in this question that received the highest percentages of the rating very effective (VE) were: imitation (72.90%), reference to speech syllables or vocal technique (68.60%), and imagery/creative visualization (49.20%). The three strategies that received the highest percentage of ratings of somewhat effective (SE) were; verbal descriptions of internal physiology (57.60%), using diagrams of internal structures (50.40%), and pictures evoking the desired sound (36.80%). The highest percentage of the rating of no opinion (NO) went to equipment and devices (40.70%) and other strategy (71.20%).

The same five-point scale for rating effectiveness was used in the three final questions, 17-19. Each question referred to a narrower area of internal technique; tonguing, vibrato and tone as affected by the throat, inside of the mouth and the tongue. More detailed questions were asked in order to clarify the general ratings in the previous question. In this section, respondents included the category of negative effect (NegE) and so it if represented in the following tables. The questions more specifically linked strategies to particular internal techniques. Responses relating to the three areas of tonguing, vibrato and tone are shown in Tables 12, 13 and 14. Highest percentage of answers are displayed in bold.

Table 12

Effectiveness of Strategies for the Teaching of Tonguing

	Ratings in Percentages				
	NegE	NE	NO	SE	VE
Anatomical Models					
Interior of Mouth	1.00	14.30	**37.10**	32.40	15.20
Interior of Throat	1.90	21.20	**43.30**	21.20	12.50
Interior of Nose	2.90	28.60	**47.60**	14.30	6.70
Visual Depictions					
Sound Shape	1.90	20.20	26.00	**36.50**	15.40
Verbal Description of Physiology of the Mouth/throat/tongue					
Discussing shape	0.00	4.80	6.70	43.80	**44.80**
Discussing feeling	0.00	7.60	6.70	**44.80**	41.00
Discussing structure	0.00	6.70	11.40	**42.90**	39.00
Imagery/Creative Visualization					
Images/feelings	0.90	17.90	14.20	**43.40**	23.60
Colors/emotions	1.90	16.20	14.30	**41.90**	25.70

	NegE	NE	NO	SE	VE
Vocal/Speech Techniques					
Syllables/Tongue	0.00	3.80	3.80	22.60	**69.80**
Syllables/Mouth	0.00	1.90	10.40	32.10	**55**.70
Syllables/Throat	1.00	6.70	15.20	31.40	**45.70**
Resonators	0.00	7.80	**34.00**	**34.00**	24.30
Vocal Technique	0.00	6.80	31.10	**32.00**	30.10
Modeling					
Teacher Modeling	0.00	2.80	0.90	37.70	**58.50**
Imitating	0.00	3.80	1.90	25.70	**68.60**
Device	2.90	12.40	**41.90**	23.80	19.00

(NegE) negative effect, (NE), no opinion (NO), somewhat effective (SE) to very effective (VE):

Table 13

Effectiveness of Strategies for the Teaching of Vibrato

	Ratings in Percentages				
	NegE	NE	NO	SE	VE
Visual Models					
Pictures of Mouth	1.90	19.20	**41.30**	27.90	9.60
Pictures of Throat	1.90	19.20	**44.20**	26.90	7.70
Pictures of Nose	1.90	25.70	**53.30**	14.30	4.80
Pictures of sound	1.90	15.50	21.40	**35.90**	25.20
Verbal Descriptions of Physiology					
Shape	0.00	7.70	23.10	**38.50**	30.80
Feeling	0.00	7.60	16.20	**41.90**	34.30
Structure	1.00	8.60	25.70	**39.00**	25.70
Imagery/Creative Visualization					
Images/Feelings	1.00	12.40	19.00	**44.80**	22.90
Colors/Emotions	1.90	12.50	14.40	**42.30**	28.80

	NegE	NE	NO	SE	VE
Vocal/Speech Techniques					
Vibrato	0.00	11.70	24.30	29.10	**35.00**
Mouth Shape	0.00	6.70	28.60	25.70	**39.00**
Throat Shape	1.00	10.50	28.60	29.50	**30.50**
Resonators	0.00	4.80	34.60	**36.50**	24.00
Vocal Technique	1.00	3.80	27.90	**37.50**	29.80
Modeling					
Teacher Modeling	0.00	0.90	0.90	25.50	**72.60**
Imitating Sound	0.00	1.00	2.90	22.90	**73.30**
Devices	3.80	13.50	**49.00**	16.30	17.30

(NegE) negative effect, (NE), no opinion (NO), somewhat effective (SE) to very effective (VE):

Table 14

Effectiveness of Strategies for the Teaching of Tone Quality

	Ratings in Percentages				
	NegE	NE	NO	SE	VE
Visual Models					
Pictures of Tongue	2.00	22.80	**38.60**	22.80	13.90
Pictures of Mouth	2.00	18.60	**38.20**	26.50	14.70
Pictures of Throat	3.90	20.40	**43.70**	22.30	9.70
Pictures of the Nose	2.90	26.90	**48.10**	15.40	6.70
Picture of Sound	2.90	18.10	**32.40**	30.50	16.20
Verbal Descriptions of Physiology					
Shape	0.00	3.80	9.50	39.00	**47.60**
Feeling	0.00	6.70	9.50	**41.90**	**41.90**
Structure	0.00	9.50	18.1	**41.90**	30.50

	NegE	NE	NO	SE	VE
Imagery					
Images/Feelings	1.90	9.50	12.40	**49.50**	26.70
Colors/Emotions	0.00	11.40	13.30	**42.90**	32.40
Vocal/Speech Techniques					
Tongue Shape	0.00	4.70	11.30	32.10	**51.90**
Mouth Shape	0.00	1.90	8.60	31.40	**58.10**
Throat Shape	0.90	3.80	12.30	32.10	**50.90**
Resonators	1.00	7.60	25.70	**34.30**	31.40
Vocal Technique	0.00	6.70	29.50	**38.10**	25.70
Modeling					
Teacher Modeling	0.00	6.70	4.80	33.30	**55.20**
Imitating Sound	0.00	0.90	3.80	26.40	**68.90**
Device	5.70	10.50	**44.80**	21.00	18.10

(NegE) negative effect, (NE), no opinion (NO), somewhat effective (SE) to very effective (VE):

Ratings Modifications in Answers to More Specific Questions

The participant's ratings of more specific categories modified the responses as compared to the earlier general question. Multiple questions were given for each strategy in an attempt to clarify different applications of the strategy. The use of visual models for internal structures elicited a majority (50.40%) response in the category of Somewhat Effective (SE) in the general question, however when rated as applying to specific areas in more detailed questions, the rating percentages were highest in the category of No Opinion (NO). Visual models of shapes of sound rated slightly lower in the detailed area, reducing the percentage of Somewhat Effective from 36.80% to 30.50% in the final question, where the greatest percentage gave No Opinion as their answer (32.40%). In the area of verbal description, 57.60% reported it was somewhat effective in the general question responses but the percentages spread out into in the neighboring categories in the detailed question responses, as more responses either went to the Very Effective (VE) category, or to No Opinion (NO). In the area of Imagery/Creative Visualization, 49.20% reported that it was Very Effective in the general question area, and in the more specific area the responses were mostly in the rating of Somewhat Effective (SE). Vocal and Speech techniques were rated in the general question to be highest in the Very Effective category (68.60%) and reduced slightly in the detailed questions, most notably in mention of resonators and vocal technique where the highest percentage of respondents put these strategies in the Somewhat Effective category. Modeling remained consistently high in respondent's ratings, from 72.90% in the general question. In the detailed question area

imitation was given the highest rating when mentioned without relation to the teacher as example but described as imitation of a desired sound. Devices elicited the highest percentage of No Opinion ratings in all questions, however 5.70% respondents rated this category as having a negative effect on tone, the highest negative rating in the survey, while 22.10% thought devices were Very Effective in the general question area.

Majority Ratings

It is useful to look at how the majority of flutists rated each strategy on the five-point scale as grouped according to preference. Below, in Tables 15-17, is shown in percentages how the majority rated each strategy under each rating category and strategy category. This way of arranging the data shows which strategies the majority reported to be most effective for specific internal aspects of flute playing in descending order starting with very effective.

Table 15

Strategies Addressing Tonguing Rated for Effectiveness: Majority Ratings Categories

Rated Very Effective

Strategy	Percent	Number
Speech Syllables: tongue	69.80	74
Imitation	68.60	72
Teacher Modeling	58.50	62
Speech syllables: mouth shape	55.70	59
Speech syllables: throat shape	45.70	48
Discussion of shape of mouth/throat/tongue	44.80	47

Rated Somewhat Effective

Strategy	Percent	Number
Describing Feeling of mouth/throat/tongue	44.80	47
Describing images or feelings	43.40	46
Discussing structure of mouth/throat/tongue	42.90	45
Speaking about colors/emotions	41.90	44

Depictions of sound shape on paper	36.50	38
Referring to vocal technique	34.00	35
Learning vocal technique	32.00	33

Rated No Opinion

Strategy	Percent	Number
Pictures of inside of nose	47.60	50
Pictures of inside of throat	43.30	45
Using a device	41.90	44
Pictures of the inside of the mouth	37.10	39
Reference to vocal technique	34.00	35

Table 16

Strategies Addressing Vibrato Rated for Effectiveness: Majority Ratings Categories

_____

Rated Very Effective

Strategy	Percent	Number
Imitating a desired sound	73.30	77
Teacher Modeling	72.60	77
Speech syllables for mouth shape	39.00	41
Speech syllables for vibrato	35.00	36
Speech syllables for throat shape	30.50	32

Rated Somewhat Effective

Strategy	Percent	Number
Descriptions of feelings/images	44.80	47
Speaking about colors/emotions	42.30	44
Describing feeling of mouth/throat/tongue	41.90	44
Discussing structure of mouth/throat/tongue	39.00	41
Discussion of shape of mouth/throat/tongue	38.50	40
Learning vocal technique	37.50	39

Reference to vocal technique	36.50	38
Depictions on paper of sound shape	35.90	37

Rated No Opinion

Strategy	Percent	Number
Pictures of the inside of nose	53.30	56
Using a device	49.00	51
Pictures of the inside of the throat	44.20	46
Pictures of the inside of the mouth	41.30	43

Table 17

Strategies Addressing Mouth/Throat/Tongue Shape as Affecting Tone Quality Rated for

Effectiveness: Majority Ratings Categories

Very Effective

Strategy	Percent	Number
Imitating a desired sound	68.90	73
Use of speech syllable for mouth shape	58.10	61
Teacher Modeling	55.20	58
Use of speech syllables for tongue shape	51.90	55
Use of speech syllables for throat shape	50.90	54
Discussion of shape of mouth/throat/tongue	47.60	50
Describing feeling of mouth/throat/tongue	41.90	44

Rated Somewhat Effective

Strategy	Percent	Number
Descriptions of images/feelings	49.50	52
Speaking about colors/emotions	42.90	45

Describing feeling of mouth/throat/tongue	41.90	44
Discussing structure of mouth/throat/tongue	41.90	44
Learning vocal technique	38.10	40
Reference to vocal techniques	34.30	36

Rated No Opinion

Strategy	Percent	Number
Pictures of the Inside of the nose	48.10	50
Using a device	44.80	47
Pictures of the inside of the throat	43.70	45
Pictures of the tongue	38.60	39
Pictures of the inside of the mouth	38.20	39
Depictions on paper of a desired sound	32.40	34

Flutists' Preferences

The largest group of flutists in the survey thought that imitating the teacher's example was one of the most useful strategies for teaching internal aspects of flute technique (98 or 83.80 % of respondents). Next rated was, 96, or 69.20 %, who thought that references to speech syllables or vocal techniques were a most useful strategy. 81 or 69.20% thought verbal descriptions of internal physiology, and 70 or 59.80% thought imagery or creative

visualization were one of the most useful strategies. The other strategies were rated

much lower, perhaps because historically they were not used as frequently. Few flute

books contained pictures of the inside of the mouth, tongue and throat and images of

sound shapes. None contained references to devices other than the strategy of spitting

rice. Most flutists seemed to prefer the traditional approaches, however a majority had

experienced newer approaches (67 or 53.20%) and some believed they were also useful

(29 or 24.80% for devices, 14 or 12.00% for other strategies). This points to a hierarchy

of effectiveness in strategies as perceived by respondents. In the more detailed response

area of the survey, respondents related their views on the traditional strategies when

applied more specifically to internal areas on a five-point scale. Flutists rated traditional

strategies, general categories of "devices" and "other strategies" on a five-point scale of

Negative Effect, Not Effective, No Opinion, Somewhat Effective and Very Effective.

Statements were more specific to internal techniques and the application of specific

strategies to them. Response numbers averaged 104 for this detailed question area of the

survey. Responses for each question were spread across the ratings categories, however

there were clear majority opinions expressed for each strategy. The majority opinions

stated in the responses are a useful tool in establishing a framework for understanding

frequency of effectiveness. Standard deviations and means for the rated questions appear

in Appendix C. A summary of the majority responses for the general strategy categories

is shown below in Table 18.

Table 18

Strategies Addressing all Internal Techniques Rated for Effectiveness: Majority Ratings

Categories

Very Effective Rating

Strategy	Percent	Number
Imitating	72.90	86
Speech/Vocal	68.60	81
Imagery/Creative Visualization	49.20	58

Rated Somewhat Effective

Strategy	Percent	Number
Verbal Descriptions of Internal Physiology	57.60	68
Diagrams of Internal Structures	50.40	59
Pictures of shapes/sound	36.80	43

Rated No Opinion

Strategy	Percent	Number
Other Strategy	71.20	47
Equipment or Devices	40.70	46

Exposure to Strategies and Ratings of Strategies

It was found that respondents had the most exposure to certain strategies, and this high amount of exposure may have contributed to those strategies being nominated as the most effective of the strategies included in the survey.   This affects how they perceived the effectiveness of strategies, in relation to research questions 2 and 3:

2. How do flutists perceive the effectiveness of these strategies?

3. Are some strategies for teaching internal flute techniques perceived to be more effective than others?

Respondents were asked to rate all the strategies regardless of their exposure to them, and this could have resulted in the less-experienced strategies being rated as not as effective or the respondent having no opinion about that method. Teacher modeling was

highly rated in all areas of internal technique and was also experienced by the majority of the respondents, while pictures or diagrams were experienced by the fewest respondents and also were categorized most often under the column of "no opinion" or "somewhat effective."

Minority Views and the Rating of Strategies

It was found that the majority of surveyed flutists preferred traditional strategies, but that there were a significant number who used newer strategies and believed in their effectiveness, which is why those strategies were investigated further in part two of this study. Equally important are the views of respondents to the survey who expressed the opinion that strategies had a negative effect. While none of the strategies was given a majority of ratings in the category called "negative effect," the researcher felt that the opinions must be mentioned concerning possible undesired effects on students. In the general five-point rating area, no respondents reported that any strategy produced a negative effect, however in the more detailed question area there were ratings in that column. Tables 19-21 show percentages and numbers of respondents who believed that specific strategies caused a negative effect.

Table 19

Strategies Addressing Tonguing Rated as Producing a Negative Effect

Strategy	Percentage	Number
Using a device for practice	2.90	3
Pictures of the Inside of the nose	2.90	3
Depictions on pare of a desired sound	1.90	2
Speaking about colors or emotions	1.90	2
Pictures of the inside of the throat	1.90	2
Use of speech syllables for throat shape	1.00	1
Pictures of the inside of the mouth	1.00	1
Descriptions on images or feelings	0.90	1

Table 20

Strategies Addressing Vibrato Rated as Negative Effect

Strategy	Percentage	Number
Using a device	3.80	4
Depictions on paper of sound	1.90	2
Speaking about colors/emotions	1.90	2
Pictures of the inside of the mouth	1.90	2
Pictures of the inside of the throat	1.90	2
Pictures of the inside of the nose	1.90	2
Use of speech syllables for throat shape	1.00	1
Descriptions of images/feelings	1.00	1
Discussing structure of mouth/throat/tongue	1.00	1
Learning vocal technique	1.00	1

Table 21

Strategies Addressing Mouth/Throat/Tongue Shape Affecting Tone Rated as Negative

Effect

Strategy	Percentage	Number
Using a device	5.70	6
Pictures of the inside of the throat	3.90	4
Pictures of the inside of the nose	2.90	3
Depictions on paper of a desired sound	2.90	3
Pictures of the inside of the mouth	2.00	2
Pictures of the tongue	2.00	2
Descriptions of images/feelings	1.90	2
Reference to vocal technique	1.00	1
Use of speech syllables for throat shape	0.90	1

Areas for Further Study

As a result of participants' nominations of newer strategies in the open-answer areas of the survey, the following strategies were investigated in observations and interviews for part two of this study:

- Pneumo-pro device

- Pinwheels

- Breath builder machine

- Paper strips

- Buzzing the lips

- Finger breaths

- Breathing bag

- Balloons/Plastic bag

- Body positions as in the Alexander Technique

- The use of recording devices/video, iPod, iPhone

- Spectral Analysis

Chapter V

FINDINGS

Introduction

Part two of this study consisted of observations and interviews of newer instructional strategies that were reported by participants in the survey. The interviews and observations sought to answer the research questions regarding "other" strategies that were not found in the review of the literature on flute teaching. The research questions are restated below.

Research Questions

1. What is the incidence of use of the following instructional practices in the teaching of internal flute techniques such as vibrato, throat and mouth shape, tonguing and tongue placement?

> Verbal Description of:
>
>> Internal physiology
>>
>> Creative visualization/imagery
>>
>> Vocal/Speech techniques
>
> Visual Models of Anatomy
>
> Visual Representations/Pictures of Shapes, Colors or Places
>
> Teacher Modeling with Student Imitation

2. How do flutists perceive the effectiveness of these strategies?

3. Are some strategies for teaching internal flute techniques perceived to be more effective than others

4. What other strategies are being used to teach internal flute techniques?

Part Two of this study was an investigation of "other" strategies and devices named in the survey by flutists, as they relate to research questions three and four. These strategies were reported by the respondents in the survey to be effective in addressing internal aspects of flute technique. The survey conducted in part one of this study asked participants to rate the effectiveness of strategies that were found in the search of the literature and asked participants to add any other strategies they have found to be effective. In three open-ended question response areas, respondents named the "other" strategies and devices they found to be effective, some also suggested flutists who utilized these strategies, and some also discussed the strategies and their usefulness. Several respondents also emailed the researcher to suggest names for interviews and observations for part two of this study. Further searches for users of Spectral Analysis and Pneumo-Pro were done because they were named without suggestions of flutists to interview or observe. Users of these strategies were sought through the flute electronic mailing list of Larry Krantz of Syracuse University. The interviews questions, observational data and correspondence on all the strategies were conducted in order to answer research questions 3 and 4, which asked if there were some strategies that were perceived to be more effective than others, and what other strategies are being used to teach internal flute techniques.

The "other" strategies and devices named by participants were:

- Pneumo-Pro Device/Pinwheels/Straws/Rice

- Buzzing the lips

- Finger Breaths/ Breath Builder Machine/Breathing Bag/Balloons/Plastic

- Bag/Paper strips

- Body Positions as in Alexander Technique

- Spectral Analysis

- The use of recording devices/video; iPod, iPhone

The strategies named in the survey were investigated with the use of interviews and observations.   The interviews sought a definition of each strategy, the history of the strategy (where the strategy came from, when it was created and who devised it), how it was used and what the user thought made it so effective. Interviews and observations were recorded on a digital recorder and later transcribed. Notes were also taken in case of failure of the recording device. The observations were of regular music lessons and therefore included strategies and techniques that addressed both internal and external techniques on the flute, as well as basic musicianship including instruction on repertoire, phrasing and style. Observations were non-participatory however the participants knew of the research focus on a specific strategy. The teachers were asked to use regular lesson content rather than modifying the lesson for the researcher.

Interview and Observation Circumstances

Interviews were conducted in person, via Skype or on the telephone. Many of the participants preferred to be interviewed on Skype for scheduling convenience even though they were in the New York City area at the time of the study. This showed the familiarity and common acceptance of Skype as an alternative for in-person conversations. One telephone interview was conducted because the participant did not use Skype and required the use of the telephone speaker function in order for the researcher's recording device to pick up both voices. Observations were conducted primarily in person but also using conferencing software. Skype, telephone and conferencing software as tools were mostly successful despite some sound problems with both Skype and the conferencing software. Sound problems with the speaker on the telephone were minor, resulting in parts of words being cut off. Participants in interviews were able to repeat information or later correct misheard transcriptions when they performed their participant check. It was found that the conferencing software used for one master class was particularly disruptive. The program used for the master class, called Ustream, included advertisements every few minutes that covered over the class activities. Because of this drawback there were some periods of time that were not observed during the class. The digital recording device used in interviews and observations was a Zoom H2 Handy Recorder and was mostly functional, other than times where ambient noise made the tape inaudible. Noise was present on the tape due to conducting interviews in cafes or using Skype, where sound quality sometimes

deteriorated. In cases where the tape was not audible, researcher notes were used to fill in missed data and participants were asked to check transcriptions, including researcher notes, for accuracy.

Participant Checking

All participants completed a consent form as required and approved by the Institutional Review Board. Transcriptions of the interviews and observations were sent to participants for checking. All participants consented to the use of the transcriptions, with minor additions or clarifications to fill in missed data. One participant asked that her language be edited for more formality. The words of the participants from interviews and observations are direct quotes as approved by participants. Descriptions of observations are in the words of the researcher.

Organization of the Data

The genealogy of the strategy and the aspects of flute technique that the strategies sought to address were taken into account when grouping the strategies.

Identity of Participants

Participants in interviews and observations either volunteered or were suggested by survey participants. All of the participants suggested in the survey agreed to be interviewed and/or observed and to have their names used in this paper. One suggested participant of two named by the manufacturer of the pneumo-pro agreed to participate. Two of the four users of spectral analysis who contacted the researcher agreed to

participate in the study. The participants in the interviews and observations were; Keith Underwood, Hillary Jones, Immanuel Davis, Catherine LeGrand, Paula Gudmundson, Rachel Brown, Katherine Saenger, Patricia George and Tina Christie.

Description of Participants

Brown, Davis, George, LeGrand, Gudmundsen and Underwood taught at the college level at the time of the study. Christis and Saenger taught at the pre-college level. Jones was a graduate student. Further biographical information on the participants is found in the appendix.

Nature of Observation Settings

The researcher was invited to observe several classes and lessons in different venues. Underwood gave a class during a weekday to flutists of various affiliations, using the Bloomingdale School of Music premises. This class was advertized through the New York Flute Club email message system sent to members by coordinator, Mary Ann Tu. The class was streamed to observers who paid an auditor fee in advance using conferencing software called UStream. The researcher was curious about the potential quality of conferencing and decided to observe this class in addition to Underwood's classes at colleges, to which she had been invited. The class at the Bloomingdale School of Music was mainly attended by adult amateurs with some college students. Bloomingdale School of Music is a pre-college community music school, and it appeared that the venue was used by Keith Underwood by permission of the school possibly as a rental, since the population of the class were all over the age of 18. The sound quality

was disappointing, as were the interruptions made by advertising, however it was worthwhile to observe Underwood teaching in a public setting for contrast with his college teaching.

The flute class given by Brown used a for-hire studio in Manhattan and was also advertized through the New York Flute Club emails from organizer Mary Ann Tu. The class was given on a weekday and consisted of adult professionals and amateurs who played baroque flute. The classes at New York University and Mannes College of Music were composed of students who studied with Underwood privately and also included students of other teachers. Each faculty had many flute teachers on staff and it was assumed that most students in the classes were not studying privately with Underwood. Both classes were regularly scheduled and required for flute performance majors at each school. The lesson that was observed at New York University given by Underwood to the student named Hilary Jones directly followed one of the flute classes using the same room.

Interviews conducted on Skype took place in the home office of the researcher and the home studios of the participants. LeGrand, Brown and Gudmundson participated without interruption, although the camera on Gudmundson's Skype software was not functioning so she could not be seen. This was a little awkward for the researcher, who could be seen on camera by Gudmundson. Underwood and George also spoke on Skype from their home studios but were interrupted several times by phone calls and people at the door. The Skype call to George was of extremely unstable quality and so had to be restarted

occasionally as the sound became garbled. The telephone interview with Christie was conducted from her home without interruption. Davis and Jones were interviewed live at cafes. This was successful in that there were no interruptions however the noise of the cafes was annoying and perhaps a little distracting. The observation of Saenger at the New York Flute Club Flute Fair was similarly noisy which proved to make recording impossible in that instance.

Dates of Observations and Interviews

The participants were contacted starting in 2011 and continued through early 2012 as suggestions were made in the survey responses. Interviews and observations began in October 2011 and continued into the spring of 2012. Participants who were interviewed and/or observed on Buzzing, Body Positions, Finger Breaths, Breath Builder Machine, Breathing Bag and recording devices all had either volunteered themselves or were nominated on the survey by others. The participant who used the pneumo-pro was found through the suggestion of the manufacturer, Kathy Blocki. Participants who used Spectral Analysis were found through the flute electronic mailing list run by Larry Krantz through Syracuse University and through the New York Flute Club. The dates of interviews and observations were as follow:

- October 11, 2011: Keith Underwood, Flute Class Observation, Bloomingdale School of Music via Ustream Conferencing Software.
- October 13, 2011: Keith Underwood, Flute Class Observation at New York University.

- Oct. 13, 2011: Hillary Jones, Lesson Observation.

- November 28, 2011: Catherine LeGrand, Interview via Skype.

- December 7, 2011: Keith Underwood, Flute Class at Mannes School of Music.

- December 8, 2011: Keith Underwood, Flute Class at New York University.

- December 8, 2011: Hillary Jones, Live Interview.

- December 22, 2011: Keith Underwood, Interview via Skype.

- December 26, 2011: Keith Underwood, Interview via Skype.

- January 5, 2012: Paula Gudmundson, Interview via Skype.

- January 10, 2012: Immanual Davis, Live Interview.

- January 30, 2012: Rachel Brown, Flute Class Observation.

- February 11, 2012: Rachel Brown, Interview via Skype.

- March 24, 2012: Katherine Saenger: Spectral Analysis Observation at the New York Flute Fair.

- April 6, 2012: Patricia George, Interview via Skype.

- May 23, 2012: Tina Christie, Interview via Telephone.

Use of Strategies

Several of the participants were observed and interviewed on more than one strategy. Keith Underwood used the highest number of the strategies being investigated, while Tina Christie was interviewed about one strategy. Others were found to use various numbers of the strategies being investigated or they used alternatives that they reported to be equally effective. Several strategies were usually used in groups and this reflected the genealogy of those strategies descended from brass pedagogy.

Pneumo-Pro Device

The pneumo-pro device was invented by Kathi Blocki, who sells it on her website and through some music retailers. The website of the manufacturer (http://www.blockiflute.com/) contained information on the device in the free resources tab. The pneumo-pro device is pictured in the image below:

Figure 8: Pneumo-Pro

Provided by and used by permission of the inventor, Kathy Blocki

The pneumo-pro is a mock head-joint onto which small fan blades are attached. The

fans are meant to show air direction and speed while the player simulates playing the

flute. The pneumo-pro information sheets/download available on the website gave two

specific references to aspects of internal technique: tone and tonguing. It is said to "form

the ability to project a more resonant tone" and to improve tonguing so that the tone

quality does not digress to a less focused sound. "The same fan that spun on the held note without articulation should spin while the student tongues" Videos available on the website under the YouTube tab include a demonstration of the use of the pneumo-pro to aid tonguing practice. In an email from the inventor, Kathy Blocki outlined the creation of the device. She stated that the pneumo-pro was invented in an earlier form during the 1990s. The current shape was premiered in 2008 and was designed under the consultation of flute maker, Bick Brannen.

Users of this strategy were sought through the flute electronic mailing list and through contacts with the New York Flute Club and New Jersey Flute Society. After many months of searching Kathy Blocki was contacted in order to find a teacher who used this strategy. Kathy suggested two British flutists and the one who responded was Rachel Brown, who is based in London. Rachel was contacted via email prior to a tour that brought her New York City. She participated in an interview after the tour via Skype, on Feb. 11, 2012. She was also observed while teaching a class in New York City on January 30, 2012.

The master class Brown taught focused on Baroque flute and the pneumo-pro was mentioned once at the end of the three-hour class. Rachel showed the device to the class and discussed its helpfulness in showing the direction in which the breath is going. She mentioned that most problems on the flute are invisible and that the pneumo-pro made what the breath does visible. She later repeated this perceived benefit of the device, of making the invisible visible, in her interview.

Well it's really the fact that it's so visible. You know, if you're playing a stringed instrument, somebody can so easily look at your posture and say, "You're simply not holding the bow right", or you are playing with the bow but it's snaking around all over the strings and not keeping in a straight line with the bridge, or your elbow is coming around behind you. Those kind of things are so easily diagnosed. We have a problem with the flute that so much of it is either inside the mouth so nobody can see it, or it's invisible. To be quite honest I think an awful lot of teaching goes on where it's just guesswork. You know, try this, try that, try the other. Sometimes it's very easy to know what the problem is, sometimes it's a bit of a mystery really and we are all trying our best to help students make progress fast so that they can just have as much fun as possible, really, instead of being bogged down by technical difficulties. This is just something that, in the time that I've been using it, I find it almost instantly sorts people's problems out. If you can tell them what they are doing at the moment, what they should be doing, get them to do it, and then transfer it back onto the flute, it's invaluable, really.

Making the invisible visible and how beneficial this is to flute players is a theme of

many of the devices investigated in this study. A related benefit Brown discussed was

using the pneumo-pro as a way of ensuring that beginner students got a sound out of the

instrument quickly, and for improving the sound of more advanced students. She

discussed the kind of breath required to improve the sound and how the pneumo-pro

helped her students achieve this. Brown said;

So, anything like this which can help in giving us a much more visual awareness is a huge, huge aide. What I try, actually, with the students is to, once they can see what they're doing, is to then retain it as a physical memory, so they're not reliant actually long-term on the pneumo-pro. This is just a stepping-stone because of course when you're playing you can't use it. They've got to first achieve it and then remember it with their muscles and with their ears as to what it sounded like, what it felt like to be in that position and to try and reproduce that on call, really.

The discussion of feeling memory, or kinesthetic memory, is another theme found

with devices used by flutists. Brown stated the obvious, that the device could not be used

when playing the flute. She discussed how the memory of what the device achieved

would have to be learned and remembered. Without such a device, teachers have

alternative methods for achieving this muscle or kinesthetic memory. Brown spoke about

her own alternatives to using the pneumo-pro, which she had been using for less than two

years at the time of interview. Prior to that time she used an exercise strategy instead,

where she directed the air up to the hair on her forehead, down to her chin and up to her

hair again. She had been doing this exercise for many years and therefore did not find a

need to use the pneumo-pro in her own personal practice.

> My daily warm-up is a note-bending thing where I'm blowing what I call the
> "Fringe-Beard-Fringe" exercise. So I'm using this. That for me is the basis of all my
> technique, really. So, you know I've done that for years without this so in a way, for
> myself, I don't really need it.

Although Brown did not see the need to use this device herself, she was enthusiastic

about using it with her students. Perhaps the visual and kinesthetic learning were more

concrete or the results were faster to obtain with the device. It was possible to learn the

same things without the pneumo-pro because she had learned them without the device.

Brown also recommended the pneumo-pro for tonguing practice. The application was in

creating the continuous airstream needed to sustain the fan blade movement of the

pneumo-pro.

> It's also useful for tonguing, actually. For instance, some of the problems with
> double tonguing is that quite often one gets so obsessed with what's going on with the
> tongue that not enough breath is coming into the instrument.

Continuous air movement was a theme also mentioned by other participants using other strategies. While Brown felt this device helped to teach this concept, the drawback to this strategy was with the operation of the device.

> With the fans I would say that the only drawback is sometimes if you're blowing very gently they don't go around at all.

The visual model of the breath seemed to be the most useful aspect of this device, because the fan blades showed the direction and speed of air, although a very gentle breath was not shown because of the failure of the blades to respond. Continuous air stream was an important quality shown by this device, as was the kinesthetic learning provided by the device. Tonguing and tone were reported to be the aspects of internal technique that benefited from the use of this device. The alternative strategy given by Rachel that she used prior to using the pneumo-pro was the "fringe-beard-fringe" exercise. In this illustration, the air is directed up to the "fringe" (bangs in American English) and down to the chin. She also spoke of students blowing onto their hands to practice changing air direction. Brown seemed to be using the pneumo-pro as a visual model and also a kinesthetic model of what she wanted her students to do while playing the flute in a normal manner.

When asked what other strategies she would use to help students with internal aspects of flute technique, Brown reported that she used yoga for basic posture and to "elongate the spine". She also used a drinking straw. These are discussed further below.

Pinwheels

The device that compared most closely to the pneumo-pro was the pinwheel. George

stated that she had used pinwheels with the same purpose of showing breath direction and

speed. She discussed this strategy as compared to buying a pneumo-pro.

> …you can buy an inexpensive pinwheel and move it up and down in front of the
> flute player to get the exact same results. I used to buy them from a party store. They
> aren't as big as the ones they have at the dollar store. They are kind of like party
> favors. The cost is under fifty cents each.

The function of the pinwheel was not mentioned, as in how well the blades spun while

blowing softly. The difference in this strategy as compared to the pneumo-pro was that

the teacher had to hold the pinwheel whereas the student could use the pneumo-pro

independently. The two strategies were discussed as being effective in addressing air

speed and direction. George also mentioned the alternative technique that Brown used of

blowing on the hand. "You can have your student put their hand in front of them and feel

where the air goes."

Blowing onto the hand or to the hair and chin were seen as alternative ways to address

air speed and direction. Tonguing while doing this may not have been as effective in

showing that the air speed remained constant. Underwood discussed the technique of

blowing on the hand to help double tonguing in a class at the Bloomingdale School of

Music.

…blow on your hand and aim on the palm of your hand. Now change to tu ku. You want to make the ku in the same place as the tu. If you slow it down you will feel that the tu is higher up on the hand. Feel that you are hitting the same place.

Blowing on the hand was seen as an effective way to address air direction and tonguing, although air speed would not be as easy to judge as with a pinwheel or the pneumo-pro.

Straws

Several people mentioned the use of a straw as a teaching strategy. They all spoke about the tendency for flutists to play with their mouths too far open. George said, "I use straws a lot in my teaching for shaping the aperture to learn where to squeeze." Brown discussed the same application:

The other thing that I use with the beginners: I use a drinking straw. Basically, if I want to copy what a beginner sounds like, I play with my lips much too open. It's quite difficult for them to get this idea that basically they need to blow through a tiny hole. The lips are more or less closed. Quite often when you see beginners their lips are wide open, there's hardly any kind of shape or focus to the embouchure. What I do is I squash a drinking straw so that you can still blow through it but it's basically flat, put that between the lips and get them to blow through it and then pull the straw out as they're still blowing, put the flute there and then try and get them to replicate that small letter box shaped hole, instead of having a round hole.

Underwood, in a class at New York University on Oct. 13, 2011, stated that he was using a new device that was a cocktail straw or coffee stirrer, which he had been using for less than six months at the time of the class. He traced the influence that led him to use a straw to a clarinetist he knows. He used the coffee stirrer to address tonguing and tone. His initial introduction to the student in the class included basic descriptions of how he used it:

I put it in my mouth at about a 45-degree angle. (Demonstrates) You blow into it and breath through it.

Blow into the coffee stirrer, breath in, now play your flute (student plays f-major scale) Now tongue the scale, single tonguing (She plays). Now take your coffee stirrer, blow into the coffee stirrer and take the air back through the coffee stirrer and tongue through the coffee stirrer (He demonstrates) and see if you can make this sound. (He tongues into the stirrer) I used this all summer long. It sounds like a sprinkler. Make sure the coffee stirrer is fairly far in your mouth, sticking up behind your upper teeth and lying on top of your tongue and you tongue with the top of your tongue, not the tip. Take the air back from the coffee stirrer and play the scale back on your flute. (She does another scale). Or another use for this is a mixed rhythm (he demonstrates and she plays rhythm), Blow air into the coffee stirrer, take the air back, play rhythm on coffee stirrer, get worked up about it (Shows more animation in air use), phrase more passionately. (Student does the same) So now play the same exercise. (She plays) More pingy tonguing, right? More resonant sound.

The benefit from the use of the coffee stirrer was seen to be a "more resonant sound".

This was achieved by using less air and blowing out of a smaller aperture. The straw is a

device that gives kinesthetic feedback on limiting the air. Underwood also used the

coffee stirrer to demonstrate vibrato later in the class. The application of this smaller

straw was in the areas of tone, tonguing and vibrato. Underwood, like Brown, mentioned

that flutists tend to play with their mouths too far open. Later in the same day,

Underwood used the straw in a private lesson where he taught Jones. There, he

mentioned that the coffee stirrer, along with the buzzing technique discussed later in this

chapter, also helped the students to use less air.

I say ten million times in this class, "you guys are using way too much air". The thing that is really appealing about buzzing, and the coffee stirrer is a relative of the buzzing, is that you can't over blow when you are using the coffee stirrer, the air won't go through.

Underwood's use of the straw was to limit the amount of air and size of the aperture, as in Brown and George's use of this strategy. Underwood also used it for tonguing and vibrato practice. Limiting the amount of air being used while blowing through the device, as a kinesthetic model, seemed to be the main application of this strategy in addressing tone, tonguing and vibrato. This device was used as a kinesthetic model of the desired way to use the air in actual flute playing.

Rice

Rice was mentioned by participants in the survey as a device for use in the teaching of tonguing. This strategy has been a traditional teaching tool used by the Suzuki Flute Method, and was called "Suzuki Tonguing" by one respondent, while the other called it "rice for tonguing". The procedure of using this strategy was explained as putting rice, or something else small, into the mouth and then to spit it out as an illustration of how to tongue on the flute. Variants of this strategy were also mentioned in interviews and observations. George referred to Michel Debost, teacher at the Oberlin Conservatory from 1989-2011, whom she said likened the tongue to a champagne cork. Underwood, in his class at the Bloomingdale School of Music, talked about "spitting off the top of the tongue". He referred to Marcel Moyse (1889-1984), founder of the Marlboro Music School and Festival, whom he said believed in spitting as practice for tonguing. He told a story in which he said Moyse described tonguing as if one was at a party and trying to spit out food inconspicuously into their napkin. Underwood told this story during a discussion in which he recommended keeping the tongue forward in the mouth. The illustration concerned both tonguing and overall tongue placement. Spitting out an object

also ensured that air was moving fast enough to expel the object. Spitting objects was discussed as a way of illustrating tongue placement and movement and to give the student an illustration by means of an activity. Spitting objects was used as a kinesthetic model of tongue placement, tongue movement and air movement.

Buzzing

The strategy of buzzing was defined as vibrating the lips as brass players do while they play their instruments. The genealogy of this strategy was said by several participants to be from the brass world to the flute world by means of several individuals. While George said that she had experimented with it independently over twenty years ago, having become interested in it because of a son who played the horn, others had been introduced to buzzing by brass players later. Underwood stated that his flute teacher at Yale Music School, Thomas Nyfenger (1936-1990), had the ability to make a good sound on brass instruments but it was only later when Underwood taught breathing technique to brass players that one of the students recommended he read the book Trumpet Secrets by Jerome Callet (1930-). Jerome was concerned mainly with the placement of the tongue as applied to trumpet playing but Underwood thought that his concepts were applicable to the flute.

In 2002 I asked to play for him and show how I thought it was an easy application to apply his concepts to flute playing. He suggested to me that I try what he calls "stick buzzing". Buzzing my lips with my tongue in a forward position. He suggested that I try that to get a sense of not simply applying his concepts of tongue placement and lip placement but to try to buzz my lips to get a sense of how the tongue placement and lip formation fit together to change registers.

Davis went along with Underwood to meet Jerome Callet, and so he also began buzzing after that initial meeting. The other participants who used this strategy were current or former students of Underwood and Davis. The purpose of the strategy seems to have been to learn an overall placement of the tongue and for restricting the use of air. While buzzing was a brass technique, Underwood discussed tongue placement as taught by an earlier teacher of his, who was a professional player of multiple wind instruments, named Sal Amato.

> I mention to people again that I didn't do this until 2002 but my very first significant teacher, Sal Amato, was a doubler. He played many instruments. He originally was a flute player. The first lesson I had with Sal, he said to me "bring your tongue forward and form your lips around your tongue". He said, when I was 17 years old, "your lips should wrap around your tongue". Basically I think that Jerome's concept of trumpet embouchure follows that pattern.

Tongue placement was achieved by Sal Amato without buzzing the lips, and was described to Underwood as a verbal description of internal anatomy. While Underwood had learned of this tongue placement without buzzing the lips, he seemed to find more benefit from the use of buzzing for tongue placement over the description of internal anatomy. Another benefit from buzzing, the restriction of air use by the use of "resistance" was discussed in the interview

> As much as I'm a fan of breathing teaching I think people confuse problems that people have with their embouchures with problems with breathing. So frequently, when someone can't sustain a note people will say, "take a deeper breath". Actually the thing that is causing them not to be able to sustain a note is a lack of embouchure coordination. The buzzing is the best thing I've ever seen for focusing people's embouchures and creating the right resistance in the front of the mouth.

Embouchure coordination was a theme discussed by other participants, and the placement of the tongue and the shape of the interior of the mouth were seen as part of this. Buzzing the lips was used as a kinesthetic model for the ideal formation of this coordination. While teaching a student to buzz for the first time, Underwood discussed its application for limiting the amount of air that is blown into the flute:

> It takes all the blowing out of your playing. That's the really great thing about it. It takes all this away. The thing that's really appealing to me is that the better you do the buzzing you can't over blow.

Davis discussed restricting the amount of air being blown and creating pressure and compression in the mouth.

> Usually I use it when I see or hear that somebody is blowing too hard, when they're running out of air too easily, and so from my experience that has lead me to realize that's because the tongue and the lips aren't working well together. Usually the first thing I do is make someone blow raspberries. (blows raspberry) Just to make them get the sensation of buzzing on their lips and with their tongue…The idea behind the buzzing is that you are compressing the air between the tongue and the lip.

Creating a kinesthetic model of air compression was similar to Underwood's discussion of creating resistance. Davis also spoke about how the buzzing would help the student to feel where sound should be created, which he said should be in the front of the mouth.

> As you get more developed with it making the sound, making the contact in the place where the sound has to happen, which is at the front of your mouth. It's the equivalent of a string player having good contact with their bow, where they just have

the contact on the string and they don't have to go so hard to make the sound, the right touch and then the sound resonates, it gets you to have that.

LeGrand, who learned the buzzing strategy from Underwood soon after he started using it, also spoke about directing the air and forming the shape of the inside of the mouth for efficiency.

The buzzing teaches a person how to direct their air efficiently from the front of their mouth. So it's all about creating a little tunnel of air between the tongue and the upper lip to aim the air into the flute efficiently. Controlling that little wind way between the surface area of the tongue and the upper teeth and the upper lip, and how that affects where the air goes into the flute.

It really isolates that wind way between the surface area of the tongue and the upper teeth and the back and side of the lip. It really creates efficiency.

Gudmundson learned the buzzing strategy from Davis and had been using it for 5 or 6 years at the time of the interview. She also described using buzzing with her students for tone, tonguing, vibrato and for illustrating the placement of the tongue.

At first I thought it was a little bit torturous. As I became a little more able to do it myself and able to show my students how to do it I have see an amazing ability to show them the placement of their tongue by them doing the buzzing. They are also able to understand how much air they have to use in buzzing. All of it is more experiential. The idea is that through that they can use that same idea when they are playing the flute. It definitely affects their sound, their articulation, it develops a sense of how they are going to do this on their own. Instead of talking abstractly about the position of their tongue or talking about their embouchure or those sorts of things too abstractly. You can also address elements of vibrato with buzzing so I've found that to be a really useful tool.

Gudmundson used buzzing as a kinesthetic model instead of using verbal description of internal structures. Gudmundson also compared using the buzzing strategy to using the Suzuki strategy of spitting rice. These both addressed tongue placement as illustrations and kinesthetic models for playing the flute.

It's really fascinating how you are able to teach elements like simple tongue placement. The Suzuki Method uses some element of teaching this when they say to spit rice. What I like about the technique is that you can get young students to visualize something that you could talk about really abstractly. With my young students sometimes I introduce the buzzing for a variety of reasons and I've seen it work really effectively. For example, when students have a lopsided embouchure it gets all of their facial muscles to work. I also like it because students get a better sense of what muscles it takes to play the flute. It's a really simple procedure and everybody is able to do it with a couple of tries. That's what I really like about it. I've really been able to use it with beginning students to intermediate students, to get them to really improve their tone, understand how their tongue works in their mouth, and from their working with vibrato, being able to produce a buzzing tone while also doing vibrato. They're able to understand how their vibrato works within their sound.

Gudmundson used this strategy alternately with playing in lessons so that the student's lips would not go numb from the buzzing. This drawback to the strategy was the reason that George decided not to continue using it after experimenting with it twenty years ago.

I think that the tissues we use here in the aperture are really quite fragile. The buzzing, I think, desensitizes it. For a flute player that's not how we make our sound. I think its counterproductive.

Jones was a new student of Underwood's at the time of the study and her first introduction to buzzing was observed. She was interviewed six weeks later and she discussed other opinions she has heard about buzzing for flutists:

From what Keith has said to me, his buzzing techniques have come under a lot of scrutiny. Apparently this thing blew up on the internet where people were very critical of the buzzing technique. I have also spoken to other teachers who firmly disagree with the concept of buzzing.

Buzzing was not historically a teaching strategy for the flute and has only recently been employed by flutists, so its use was not condoned by other teachers Jones knew of, although she did not say who they were or where over the internet the controversy had erupted. Jones discussed the drawback of the buzzing strategy regarding numbing of the lips.

As flute players the buzzing helps I think in small doses. I think if you started buzzing all the time it would probably be contradictory. It would desensitize your lips so you don't want to do that all the time.

Jones spoke about the benefits of buzzing in terms of tone. She used the words "springy" and "buoyant" when describing its effects of her tone. She also discussed how it limited the amount of air that she used. She mentioned an alternative strategy that she had been using previously:

I use it pretty much every day, just to touch base with. To see how my lip should be. Its one of those things that I'll do to reorient myself with where everything should be. Kind of like using whistle tones. I use whistle tones to reorient my lip to where everything should be and I use the buzzing to reorient myself with how much air I should be using and how far out my lower lip should be and where my tongue should be in my mouth. It definitely adds a buoyancy to the sound that I don't think you can really achieve any other way.

Whistle tones are produced by gently blowing across the embouchure hole, which creates soft harmonics. They require that the lips be very still, the air be directed in a

steady stream and direction, and are used sometimes in contemporary flute technique. Jones was the only participant to mention these as an alternative to buzzing the lips.

The applications of buzzing to internal aspects of flute playing were reported to be in the areas of tone, vibrato, tonguing and general placement of the tongue in the mouth. Buzzing was another kinesthetic model creating a desired placement of internal structures for flute playing and restricting the amount of air used.

Finger Breath

Two participants in the survey mentioned Finger Breaths, although one called them "whistling finger breaths." Many used this strategy in combination with buzzing, the breath builder, the breathing bag and Alexander Technique. The evolution of this strategy also came from brass pedagogy. Underwood started using this strategy in 1984 having learned it from trumpet player Vincent Penzarella of the New York Philharmonic. Underwood traced this strategy to Arnold Jacobs, who was a noted brass teacher and was the tuba player in the Chicago Symphony. The finger breath was one of several strategies that Underwood reported came to him through contacts who had studied with Arnold Jacobs. George believed that the finger breath strategy came from Sam Palafian, tuba professor at Arizona State University as part of what he called the Breathing Gym. Patricia, however, did not think this strategy was the best way to organize breathing and did not use it. Underwood explained how he got started using the finger breath.

> When I initially did it Vince [Penzarella] showed me that I could take a breath with my finger and then blow into a spirometer that measured my breathing capacity. I had substantially more air, it felt like, after taking a finger breath, and the spirometer

measured my breath capacity as being substantially larger than I was when I was taking a breath unaided. That was my first experience with it.

Although he initially used this strategy to gain more air capacity, Underwood then

went on to use the finger breath strategy to help with tone, tonguing and other issues.

I got such great results using the finger breath that I invented a lot of exercises that you could do with the finger breath that have to do with musical issues such as register changes, articulation, or tone color. I get this weird feeling that I invented certain finger breath techniques. Other people could have invented them in a parallel universe. When I teach the finger breath technique I encourage other people to make up their own exercises. Almost everything you can imagine in music can be represented with a finger breath.

The finger breath was used as another kinesthetic model for tonguing and tone color.

Underwood described how the strategy was taught and the importance of language in

teaching, the strategy.

Its introduced initially when people play something, I ask them to place the base of their index finger against their lips, point their lips out forward and I use the term "suck", because if you say "inhale" it turn out to be a weaker sound than sucking.

I introduce it by asking someone to play something, take a breath with their finger, and then play the music with the air that they took from their finger. It almost invariably sounds better.

Underwood used the finger breath to represent things in music such as tonguing,

phrasing and blowing. He said that using a finger breath made players sound better when

they used the air they had taken in past the finger, but he did not explain how he believed

the finger breath helped. The phrasing and tonguing he spoke about were done while

inhaling past the finger. Underwood used this strategy once in a master class at Mannes

College of music, referring to it as the "Olden days of finger breath." He had the student take one breath past her finger and used it as an example to talk about tongue position.

Davis, who learned the strategy from Underwood in 1988 or 1989, discussed the effects of doing techniques in "reverse." He also had been exposed to the finger breath strategy through Mark Niehaus, a trumpeter who had studied with Arnold Jacobs. Davis explained how he perceived this strategy worked.

> It creates a resistance and it creates an amplification of the air, which is useful in two things. One, it amplifies the quality with which the air goes in. Does it go in jumpy? Does it go in changing pitches, does it go in super high and under stress? And two, the resistance of the finger enlivens your breathing mechanism. It makes it have to work just a little bit.

Davis used the finger breath for tongue placement and tonguing practice. The benefit of inhaling past the finger also in tonguing seems to have been perceived as a kinesthetic model of breathing resistance and of tongue use.

> I think it helps with the tongue placement, by the vowel you can make. I don't really use it for vibrato. I think it's helpful for doing tonguing and making articulations and hearing the vowel that continues to happen after you have started the articulation. So therefore it shows you if your tongue is stiffening or not. And again, it creates a resistance, it creates a friction on your lips, a contact on your lips with the air so that when you exhale, you don't have the exactly same feeling but you have something along those lines that gives you a similar contact with the air on your lip as you exhale. So, I think that's what it teaches you.

Davis used this strategy in teaching tonguing in combination with breathing, much as

how the pneumo-pro was used by Brown. He discussed the movement of the air and how

this could be examined by using the finger breath.

> …with tonguing I have two thoughts. One, I always say this to people, there are
> two parts to a note: a consonant; t, d or whatever you want to say is your consonant,
> and the vowel, the thing that comes afterwards. Even the shortest note has to have
> some vowel to it. When you start to do the tonguing on the finger breath you start to
> learn how to combine those two things. You start to get a nice mixture of the two of
> them. Often you will find, again, that people stop the air coming in. You learn how to
> keep the air going.

The benefit to using the finger breath doing reverse tonguing or regular tonguing was

discussed by Davis. He thought that players pushed too hard with the tongue.

> When we blow, we always have pressure against our tongue, always pushing hard
> against our tongue. It is very useful to learn how to move your tongue as you inhale,
> because there is all of a sudden no pressure on it. And then you get the lesson that it's
> not as hard as you thought it was to move your tongue. You go to play and you will
> then push a little less, or hopefully a lot less.

LeGrand spoke about the finger breath strategy in terms of kinesthetic or sensory

learning about the position of the mouth. She also stressed the direction of the air and

how the finger breath helped with that.

> The biggest thing for me is that it brings the student's awareness to the sensory
> aspect of their playing. It takes them out of their head and into the right side of their
> brain where they can experience feeling the air coming into their lips. To me that's
> the number one thing although it does teach a person how to take a deep quiet breath
> which can be used in many ways as they play. But for me it's about the sensory aspect
> of the breath. It also helps to put the top, upper mouth in a good position for aiming

the air into the flute where they're actually going to play. So it's not just about getting a deep breath. It's really about the sensory aspect of it.

LeGrand learned the strategy from Underwood, in 1995. She stressed that the sound that the air made when inhaling past the finger was instructive for the student.

Because it's a physical action and you're dealing with a sound and teaching the musicians how to breath better by making them make a sound that they can identify with their ears.

The finger breath strategy seems to have been used mostly for mouth shape, tongue placement, tonguing and breathing practice.

Breath-Builder Machine

The breath builder machine is a cylindrical plastic tube containing a ping-pong ball, closed off at one end and attached to a flexible plastic tube at the other. The tube is blown into in order to raise the ping-pong ball up. The object of the device is to keep the ball raised up while blowing out and also when inhaling through the tube. The air stream has to have sufficient force in order to lift up the ball. Also, several small holes on the device can be covered with the fingers to increase the resistance to blowing. The three small holes for this purpose are located on the top of the cylinder cover at the same end as the flexible plastic tube into which one blows.

Figure 9: Breath-Builder Machine Photo taken by Carol Hohauser-Nizza

The device was available from Windsong Press and not under patent at the time of the

study. This strategy also was reported to come from the brass pedagogical tradition,

although the creator of the device was a bassoonist. The participant in the survey who

mentioned this device called it "tube with ping pong ball". The name "Breath Builder" or

Breath Builder Machine" was used by Underwood and by those who had studied with

him. Underwood said he had learned of this strategy from trumpeter Vincent Penzarella

in 1984. Vincent Penzarella had studied with Arnold Jacobs and taught Underwood

several strategies that he had learned from Jacobs.

The guy who invented it is a bassoon player, Harold Hanson. He passed away about eight years ago. From my understanding he's the bassoon you hear on the theme to Hitchcock, from the 1950s. (Sings) He was something of an inventor. He designed the breath builder initially on a grant to figure out something for teaching wind players in New York public schools. Once he had come up with it he tried to get hospitals interested in it for therapy for lung patients. I don't think it was ever put out as a hospital device. He introduced it to Arnold Jacobs who used it substantially.

Underwood stated that the device was useful in keeping the air moving, a purpose also mentioned in the use of the pneumo-pro and finger breath strategies.

One of the best things about the breath builder is if you do it smoothly…when people breath they tend to stop and start the air continuously. Like, you take a breath and you hold it and then you play a phrase and play until you run out of air and stiffen up at the end of the phrase, and you block the air when you've taken it in. The breath builder, by encouraging you change from inhaling to exhaling and exhaling to inhaling without to ball dropping, it encourages you to have a breathing cycle that is unimpeded and that is continuous. If you just ask people to hold the ball up while breathing as gently as you can get away with and change from inhaling to exhaling and exhaling to inhaling without the ball falling, then when they go back to the instrument the transition from breathing in to breathing out has a much more seamless quality.

Underwood discussed how the breath builder device showed the continual movement of air as a visual model of air movement. He used this for tonguing practice much in the same way as the pneumo-pro was used in keeping the air moving.

You hear people say, many teachers like William Kincaid or Marcel Tabuteaux at the Curtis School, many teachers used the phrase "tongue the wind". You want to feel as if you are touching your air with your articulation without stopping it entirely. So people say tongue the breath instead of "tongue your teeth" A seamless sort of legato articulation involves technique that everybody has to work on. The breath builder is wonderful for articulation. If you articulate on the breath builder and figure out how to

articulate without the ball jumping around, when you go back to the instrument the articulation has more of a phrased quality.

Davis, who learned this strategy from Underwood in 1988, also discussed how it "teaches you to not lock or hold at the end of an exhalation" and "to go seamlessly from one direction to another." He said, "If you are tonguing and the ball is dropping or going up and down it means you are really stopping your air." While the air was tongued both on in the inhalation and the exhalation on this device, it gave a visual model of air movement through watching the ping pong ball remain elevated or drop due to loss of air pressure. Gudmundson, who had also learned this strategy from Underwood sometime in the previous ten years, discussed the breath builder as "improving coordination" and helping to "use your air more efficiently." Underwood spoke about using it to "work with people's speed and amplitude of vibrato." Davis posed questions that he said the breath builder could answer.

> …can you make a vibrato sound without it interfering with the ball and without it interfering with the air? That's what I think the breath builder is great at. That's a hard thing to teach. Again, it's an internal think you have made external. Can you figure out what it is to make this vibrating sound into the breath builder while not letting the ball drop? I think that's one of the big things it teaches.

The breath builder is another device that creates a visual model of air movement. It also created a kinesthetic model of continuous airflow, much like the other devices. The drawback of this device was that it took a lot of air to operate, and was not recommended by the participants for young children because it would make them hyperventilate.

Breathing Bag

The breathing bag was mentioned multiple times by participants in the survey. It was called breathing bag and also plastic bag or balloon. The breathing bag device was a rubber medical bag and is discussed first, followed by plastic bags, balloons and other alternatives.

Figure 10: Breathing Bag photo taken by Carol Hohauser-Nizza

The breathing bag strategy also came from brass pedagogy. Underwood reported that he had learned of it from Vincent Penzarella, a trumpet player who had studied with Arnold Jacobs, tuba player with the Chicago Symphony. Underwood learned of the

breathing bag in 1984. George gave a history of how Arnold Jacobs started using the bag

and other equipment.

> Arnold Jacob's wife was a nurse, I believe at Northwestern Medical Hospital and worked in heart or thoracic surgery. The way he got all of his equipment was that when they upgraded the equipment they used at the hospital they sold it to him for around a dollar each piece. His whole basement stored this equipment. He could measure lung capacity so people could see what they were doing. The breathing bag came out of that.

Underwood described it as a visual aid. "The bag is a way of seeing what your breath

is doing." He described how he used devices as ways of teaching without the distraction

of the instrument.

> …you can give detailed instructions as far as my experience goes that you can't actually give them while they're playing. You can't talk to them when they're playing. It's just a wonderful experience to be able to take something away from the instrument and work on it away from the instrument then put it back on the instrument. The bag is one of the best examples of that.

Davis, who learned this strategy from Underwood around 1990, described the visual

nature of the air while using the bag.

> Rather than fishing around in your own body and trying to feel your air, which can be deceptive, the bag is an external device that allows you to see the quality with which you are doing something.

Gudmundson also spoke about the ability to "visualize your air." She learned this

strategy from Davis and used the bag to show the rate of blowing into and inhaling the air

out from the bag. All three of the teachers who used the bag both blew into the bag and

then inhaled the same air, repeating this several times with the same air. It was used to

control the amount of air and the rate of exhalation, but also for specific techniques. Gudmundson spoke of using the bag for "elements of articulation, so you could be articulating four beats out versus one beat in." Davis also spoke about tonguing.

> It allows you to hear the quality of the tongue without the instrument. Does the tongue sound like it's thuddy, is it stopping the air, etc. etc.? It allows you to hear and see the air and the effect.

> I definitely use it for tonguing. I use it for tonguing because it's the result of what the bag does that tells you what the tongue is doing, that its doing the right thing. It almost doesn't matter what syllable, you can use different syllables to think these things to yourself. As long as the bag is reacting in a way that we know is the right way for it to react; it's filling up and not stopping with each articulation, being bouncy and constant. The air itself is quiet but the tongue is something we hear. That's how I use the bag.

The bag seems to have been used to ensure that the air is moving, as with the breath builder machine and finger breaths. Underwood also used the bag for vibrato and phrasing, although the others did not mention this.

> The simple exercises are the brief in and out on it, and to take music the people are doing and have them breath in rhythm with it. Then you can use it to address all kinds of issues that come up in the music by having them imagine they are doing the music, pacing and doing successive phrases of the music with articulation and even with vibrato, even with hints of dynamics.

The breathing bag was used as another visual aid for continuous airflow and for managing the amount of air used. Alternatives mentioned included a plastic bag placed on the end of the head joint with a rubber band. George discussed her method of using a plastic gallon bag.

My problem with the breathing bag is that when you play the flute you don't blow like that (shows open mouth exhale), that's not how you use the air. I had the idea to put a one-gallon bag with a twist tie on just the head joint. I put it at the end of the head joint affixed with a rubber band, then you could practice your breathing that way. You can do all the same exercises that Jacobs has you doing on the breathing bag but your embouchure is in the proper position. You are actually blowing the way you blow on the flute.

You get better results and it's more applicable than doing something with the jaw and teeth overly open. The angle of the air coming out of the aperture is going to determine how you use what you have. I think the bag on the end of the head joint is a better alternative for this.

George used the bag to practice the use of air, although her strategy would not include re-breathing the air as with the others' use of the breathing bag. The visual aspect of watching air fill the bag is similar although the flute uses air differently than the brass instruments in that much of the air escapes over the embouchure hole without going into the flute. The purpose of the bag to measure air use would remain the same, however, and other strategies were named with similar intent. One participant in the survey stated that they put a balloon over the end of the head joint. Two others stated that they stuck post-it notes to the mouthpiece to observe the movement of the air and fluttering during vibrato.

Alexander Technique

Alexander technique was mentioned numerous times by participants in the survey. Derivatives of Alexander Technique, the monkey position and Body Mapping, were also mentioned, as well as references to body positions and placing hands on the students, both of which could have referred to Alexander Technique. The Alexander Technique was created by Matthias Alexander (1869-1955), an Australian orator, and has been used by musicians, dancers and actors extensively in the late 20th century. Many music

conservatories offer Alexander Technique to students and many professionals have

sought out Alexander Technique lessons privately. The philosophy behind the Alexander

Technique includes a vocabulary and procedures that need definition. While many

musicians take Alexander Technique lessons because of performance related physical

problems, they are not engaged in a traditional form of treatment. The Alexander

philosophy speaks in terms of using the body and movement as a process, not as a

destination. Much of the philosophy is about reconsidering learned responses and

postures and learning new ways of moving without unnecessary tension.

Alexander Technique was being used by almost all of the participants in interviews

and observations to some degree. Body Mapping was used as a supplement to Alexander

Technique and was mentioned specifically by George.

> Body mapping was started by Barbara and Bill Conable. Bill was a cello professor
> at Ohio State University and Barbara was an Alexander Technique specialist. They
> got interested in using it with musicians. That's when they discovered that people use
> their body in the way that they think the body is put together. One of the first things
> that you have a person do is, if they are having a problem with a certain finger, to
> draw a picture of your hand and maybe your lower arm. You can tell by how they
> draw the picture how they map that anatomy in their mind. The goal is that through
> the pictures they have in the book they help you more correctly map that anatomy in
> your mind and then you will use your finger or hand more intelligently.

Alexander Technique was reported to be helpful in addressing internal aspects of flute

playing indirectly. LeGrand, who had been using this strategy since 2000, stated how she

believed that concentrating on posture would help students.

The specific things that I find helpful for Alexander Technique, for my students, is helping them feel how wide their shoulders can be and how to balance their heads on their spine. And all of this of course frees up the rib cage all that so it works a lot on breathing and tone production.

Alexander Technique was seen to help to overcome obstacles to tone production by physically improving the player's overall use of the body. Underwood had been using this strategy since 1980. He stated the benefits of Alexander Technique in a general way.

I think Alexander Technique is the best way for people to experience efficient posture. They don't use the term posture, Alexander teachers use the term "use." Efficient use of the body.

LeGrand also used similar words in her description of its effectiveness in teaching students how to "use" their bodies.

Well, it addresses lots of things. Basically it helps the student understand where they are in their environment. And to be more aware of what they are doing with their body and in their space. So it affects their body balancing, I don't the word posture much, and how they use themselves in their entirety.

Word choice in Alexander Technique was very important for all users of this strategy. The terminology chosen to describe the body and activities was seen to influence the outcome. Underwood spoke about the "meticulous language" of the Alexander Technique, which he compared to the teaching style of Arnold Jacobs.

In Alexander technique, they want the whole body to coordinate, they want you not to overwork and they don't want you to be tense but they avoid the words "tension and relaxation". Sort of the way that Arnold Jacobs avoids the words "inhaling and exhaling". Arnold Jacobs avoids the words "tension and relaxation" also. If you were playing tense, Arnold Jacobs would say, "you are using too much strength". The opposite of strength is weakness, so he would say you need to make a big sound by

feeling "weak" rather than "relaxed." An Alexander Technique person would say that tense muscles that are overworking "contract" and become "shorter." They call tension "shortening" and they call the opposite of tension "releasing" or "lengthening." If you want to feel relaxed in a good Alexander Technique way instead of saying, "relax your shoulders" or "relax your neck" you think of lengthening your neck and lengthening the muscles across your shoulders, or another term they would use is "widening." Lengthening and widening the muscles that are going laterally, you want them to feel wider. The muscles that are going vertically, you want them to lengthen, the sense of lengthening achieves a relaxed kind of poise. That's an aspect of language that is helping to get a point across. I use those things once again, with everybody down to the age of 7. You can say to someone who has just started to play, "can you feel like your neck is getting longer as you blow a note?" That will keep them from over blowing.

Underwood used the Alexander Technique to prevent over blowing as well as to improve the sound generally. In a lesson he taught Jones, he combined Alexander Technique discussion of body positions with buzzing to address tongue placement. He also discussed using the monkey position, an Alexander Technique strategy, with a very young student. In a class at New York University, Underwood discussed the "cat back" position.

I feel like when she ascends she does this (imitates) she gets slightly out of position. I think the position would be to stand a little forward on your feet but so your back feels more open. And then when you are ascending (plays) don't reach forward, stay in your back. I call it a cat back because it feels like (imitates a cat getting mad, hissing). So as you are going up, come up your back (student plays).

Jones discussed Underwood's use of body positions in an interview, and his term "cat backing" as well as head tilts to change the tone color. Underwood called it the "Brazilian cat back" during Jones' lesson, and described how he told another student to "stay in touch with your back you kind of breath into your back without your front sticking out so much." Gudmundson referred to another position called the "monkey

procedure." She noted that the drawback to the Alexander Technique is that "there are so many elements of Alexander Technique and the writing of Alexander that are not accessible. I think it's hard to grasp because people want immediate results." This may be why many of the participants spoke very generally about what benefits the Alexander Technique had for students. Davis, whose wife was an Alexander practitioner and who was also training to become one at the time of the interview, described what benefits he believed the Alexander Technique strategy had in addressing internal aspects of flute technique.

Well, over the long haul what the Alexander Technique does is several things. It reawakens or reeducates your kinesthetic sense. We all have habits, right? Things that we've done so many many times we don't even think about them anymore. I think my tongue is wide in my mouth because it feels like I've been doing that. With Alexander Technique, as you start to take the lessons, as you start to learn direction and you start to have a new sense of your physical self and an awareness of your habits and what you do, for example something like your tongue, you might learn that you have a tendency to narrow your tongue when going up into the high register because of tightening up, and the tongue is a symptom of tightening up. Or, "Oh, when I take a fast breath I retract my tongue, and I didn't ever notice that I did that before". So, those kinds of things the Alexander Technique is really good at. And also that the Alexander technique is really good because they talk about how function affects use. This has been proven scientifically. It means that if the entire organism is working in a well-coordinated way, if the back is not pulling in, of the breath is working well, things like the tongue, in a funny way, or even vibrato, will work better naturally, because they're not being interfered with, not being pulled on. Alexander himself depressed his larynx when he spoke. That's why he had vocal problems. He didn't know what he was doing, there was nothing physically wrong with him, he had no illness, no ailments. He learned that he was depressing his larynx as he spoke. The big thing that he saw was that as he didn't pull his head down and he didn't contract his neck he didn't depress his larynx. It was something he couldn't control directly. You can't say, "Hey, don't depress your larynx." Right? But you can make the circumstances work well, in such a way, that you won't depress your larynx. It's the same thing with the tongue or the same thing with the jaw. "Hey, don't tighten your jaw." How do I not tighten my jaw? You can and you can't but ultimately get where you are not pulling your neck in, where you're not pulling your head down or you're not arching your back or doing whatever things that people do, then your jaw will let go.

Underwood also spoke about physiology in similar ways. In another class at New York University on Dec. 8, 2011 Underwood told a student to "float your ribs a little bit more" and to "Float your ribs, keep our ribs up because that will open up the sound." These were imagery statements, and much of the language in Alexander Technique was more poetic and evocative rather than specific.

Alexander Technique used imagery and verbal descriptions of anatomy to create a kinesthetic model of the ideal placement and positioning of internal structures. Airflow was reported to benefit, as did tone, tongue placement and vibrato. Body Mapping was a way of producing a visual model of anatomy to aid in this process of learning to use the body in the most beneficial way.

Two participants used alternatives to Alexander Technique but did not specifically relate their benefits to internal aspects of technique. George and Brown both found yoga to be helpful for posture and relaxation and also warned that it could be dangerous. George said that yoga was "very hard on the wrist" and could lead to injury. Brown also stated that she would not recommend advanced postures without doing basic yoga first, and stated that the main benefit she derived from yoga was "calming."

Spectral Analysis

Participants in the survey mentioned Spectral Analysis several times either named as such or as "use of software to analyze tonal spectrum" or "spectrum analyzer for tone quality study." One respondent added that it be used "to correlate subjective terms

(light, dark) with actual spectral content." Spectral Analysis was found to be associated with the use of various computer programs that showed aspects of sound in configurations particular to that program or according to the preferences set by the user. The most popular program mentioned was Audacity, available from http://audacity.sourceforge.net/. In the more complete version, the sound was recorded in real time and stored for analysis. A program called Overtone Analyzer Live was also available in a free version where the sound was displayed in a ten second segment that was continually overwritten. Several users of this strategy wrote to the researcher about their use of other programs that had fewer features. Some individuals used spectral analysis applications made especially for smart phones, however the versions were either currently unavailable or extremely limited in their display content. Spectral analysis, as displayed by the better programs, included information about intonation, volume (amplitude) and harmonic content of sound. The visual output, the spectrogram, showed these as they occurred, and then could be studied by manipulating the screen to expand sections. It was possible to see if the player was playing in tune, how loud they were playing, how wide their vibrato was in pitch variation (and if the vibrato also varied in volume), and the harmonic content of each note played.

The researcher observed a demonstration of spectral analysis at the New York Flute Club Fair on March 24, 2012, where she also was asked to assist the presenter, flutist and scientist Katherine Saenger. Saenger had asked various professional flutists to play into the Overtone Analyzer Live software (from www.sygyt.com) to create print outs of various examples. Saenger created a display of examples with directions for participants

to experiment with the software. Displayed in illustration 11 is one of the examples

included in her display, with examples of herself playing "edgy" and "sweet" tones into

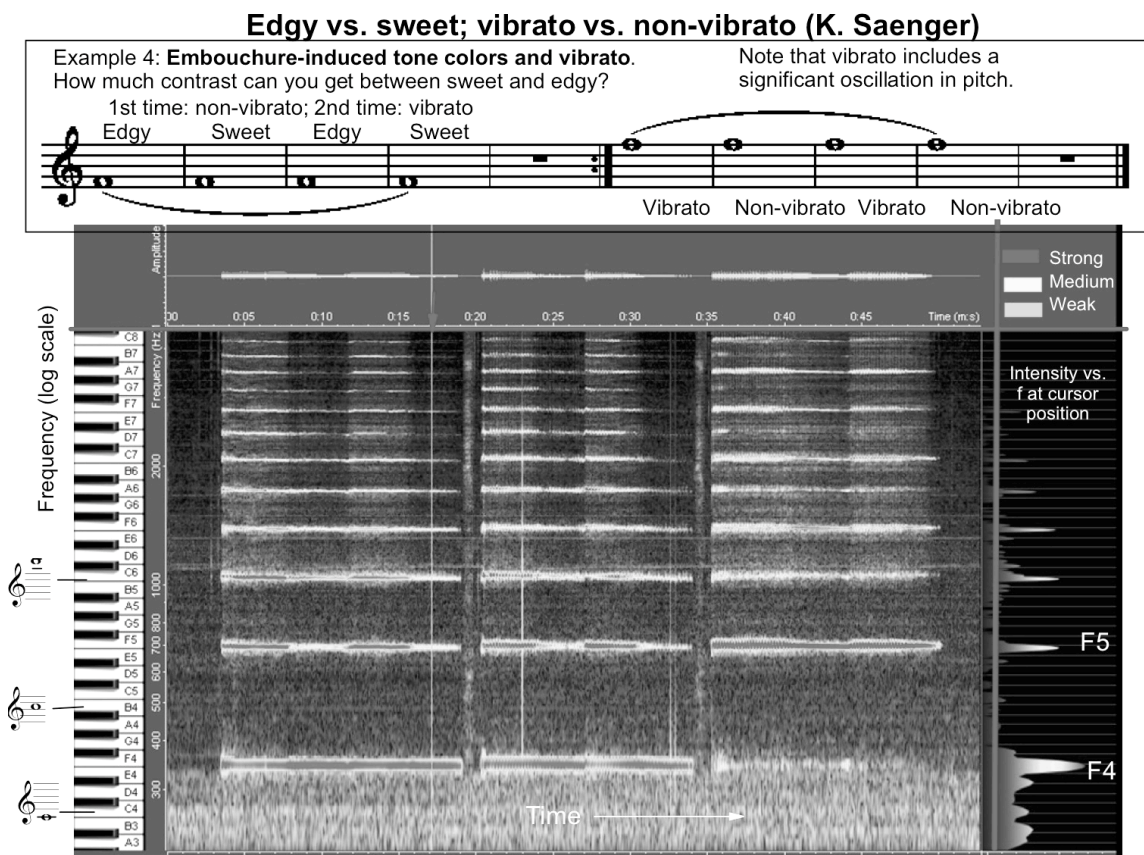the spectral analyzer.

Figure 11: Example of a spectrogram taken from K. Saenger's presentation on spectral

analysis. Displayed here in black and white but originally in color.

Used by permission from K. Saenger

Saenger said that the clearest difference in partials within a tone could be seen when a

player contrasted a very "edgy" tone with a very "sweet" tone. This was clearly seen on

the printed examples. This was similar to what the participant in the survey had reported in their terms "light and dark." The spectral content displayed of the contrasting tones was clearly different. The professionals' examples also differed from students' output in number and strength of partials over all tone qualities played. Saenger stated at the demonstration that a better sound was not just a matter of having more partials in the sound, but which partials were stronger. As flutists experimented with the software, it was noted that it took a few minutes for them to understand the display. The students who experimented with the software remarked on how they could see how loud their playing was, how in tune they were, and could see their vibrato as a pitch and/or volume change. Most saw the harmonic partials and how theirs differed from the examples of the professionals however the information provided to them in the demonstration did not include ways to make their tone more like those of the professionals.

Tina Christie was interviewed on her use of spectral analysis with students, and she gave more information on how she used this strategy for tone, intonation and volume.

I think it addresses tone color, it addresses intonation with yourself as well as playing with others, there's a huge impact on how you play with others once you get into difference tones and how those tones interact with each other. Volume would be affected, but if I had to narrow it down to one thing I would say tone color is the biggest thing it impacts.

Christie mentioned difference tones, for which Saenger also had an experiment at the demonstration. Difference tones occur when two tones are played together and the resultant tone created by the interaction of the two sound waves creates a third tone. The researcher and another flutist showed an example of this at the fair, where the third

resultant tone could also be seen on the spectrogram. Difference tones are often used by

flutists to help with tuning high notes when playing with others. The visual display of the

tone was important to Tina, who believed that students should have a "basic

understanding as to how sound is produced and how this all works."

> In reality you are creating all sorts of harmonics when you are playing a "single" note. And of course, by opening up that door and learning to control those harmonics that gives you greater flexibility of tone color, greater flexibility of dynamics and so forth.

Tina stated that she thought the visual aspect of spectral analysis was the most

valuable part of using the program. She had been using the software for ten years and

also used an app that was no longer available because the company had gone out of

business. She also noted that the students initially didn't understand what they were

looking at but that after showing them the spectrograms multiple times along with

explaining the content they would start to understand what they were seeing.

> …it's truly hard to take that all in if you haven't been introduced to those concepts before. I feel like it takes a couple times for a student to really get it and understand. With my more advanced students what I start doing with that is I get into a discussion on tone color with them.

Christie used the spectrogram directly for tone practice with advanced students. She

explained how she thought the visual model was helpful.

> With my more advanced students I will talk to them and say we have the shape that we use but we can alter our harmonic content by making them stronger or less strong. I tell them to play a note and make it sound simple like a recorder. They will play it and see what it looks like. Then I tell them to play a note and try to make it sound like

an oboe, very rich and complex. Usually there is a very marked difference the first
time that they do that. Again, it's that they can hear the difference but then they can
also see the difference. They know not only that they are making a different sound but
they understand why the sound is different because they can see it.

The visual representation of sound, specifically of harmonic content, intonation and

volume, were seen to be useful in teaching tone, intonation and vibrato. The visual

model was used in addition to aural modeling, although the mechanisms for changing the

tone were not discussed. Previous use of equipment that represented tonal content

included use of an oscillograph, as in the treatise by Roger Stevens (1967), where the

author included explanations of internal modifications that were made to change the tone

and the displayed result. The spectrogram served as a visual model to supplement

listening. Several people at the flute fair stated that they thought the ear was good

enough and that a visual display of the tonal properties was not helpful if the player could

not hear the difference. George also reported having used the oscilloscope in the past but

said she would no longer use such a strategy.

Digital Recording, Video and other Electronic Devices

Recording and video devices were mentioned on the survey in multiple ways. Camera

and video, or alternatively a mirror, were mentioned, as were voice recorder with two

speeds and the iPhone. One participant recommended playing with a tuner or drone.

Others mentioned watching and listening to examples on the web, "listening to

recordings, recordings devices with instant visual feedback, both visual and sound" and

"audio recording." These devices were investigated because of the recent availability and

easy access to devices that record, play back, manipulate the speed of the playback, and

give examples of multiple models quickly and easily.

Recording devices have been used for many decades, with examples of earlier devices given by the older participants in this study. Students have had increasing exposure to devices that record and play back for later analysis. Underwood told his class at Bloomingdale School of Music that Julius Baker had slowed down vinyl recordings of violinist Jascha Heifetz in the 1940s to learn how to imitate his vibrato. Underwood also told how he had also slowed down Long Play recordings in the 1970s to analyze the way their pitch changed during vibrato. Underwood discussed with his class at New York University how he did this while he studied with Thomas Nyfenger.

> This is what my teacher, Tom Nyfenger, did to me. I had a recording of Baker playing a Bach sonata and he slowed it down on tape reel. Then he recorded me playing the same Bach sonata and slowed me down. I could hear my vibrato grind to a halt every time I was in the vicinity of a fast note. When Julius Baker comes out of fast notes he is already vibrating. Slowed down, you could hear the vibrato going through the fast notes.

Underwood reported that he had used a reel-to-reel tape recorder in his early career, but that slowing down an example resulted in a drop in pitch, which no longer occurred with the use of digital recording devices. LeGrand also had used reel-to-reel as a student in the 1970s and 1980s, which she also said she used to slow down for analysis.

> I've always listened to a lot of historic recordings, studying vibrato. Well, I've very passionate about dead singers. I spend a lot of my time listening to recordings of dead singers. I wanted to figure out how to analyze what they were doing. That's what I think brought me to it even more so than just flute playing. Because I wanted to be able to do those things in my flute playing.

More recently, software for slowing down digital recordings has become available and was used by several of the participants in this study. The types of software ranged from apps for iPhones to computer software. Underwood spoke about this in his class at New York University.

> I use the slow-down software for rhythmic things, vibrato, hearing the number of pulses of vibrato a person is doing in each note. Some of you here have rather slow vibratos. And then other people have rather fast vibratos. Other people have really nice vibratos that stop dead when they play moving notes. Getting them to move in and out of moving notes while keeping a shimmer of a vibrato is an interesting thing to do. I noticed that the app called "Tempo Slow" has a microphone function so you can play a recording that's lyrical and then you can press the microphone and you could play the same thing into it and slow yourself down.

The ability to slow down a model for vibrato, as well as to slow down an example of the student's playing, was similar to using spectral analysis to analyze vibrato, they differed in that the slow down applications were aural rather than visual examples as in spectral analysis. Participants in the survey mentioned the tuner and drone for intonation practice. Both provided aural examples, with an additional visual component, and have been in use for some time. The researcher was surprised to see them mentioned, because they are in common usage providing visual and auditory examples of intonation. Intonation is a function of both internal and external aspects of flute technique, and the devices that showed intonation were either visual or auditory replications of what was occurring but were lacking instruction for changing those results. Teaching strategies addressing intonation encompass internal aspects of technique such as mouth shape, tongue placement and air speed, so it is understandable that the tuner was mentioned. Tuners, however, were in common use and were contained within the other electronic devices studied, such as the iPod, iPhone and iPad, so observations and interviews on the

tuner were not sought. The use of digital recording and video devices, mostly on iPhones

but also on computers, was investigated because it was a newer development in teaching.

Video capability on hand-held devices, universally found in this study to be the

iPhone, iPod or iPad, was the most recent development of the use of computers for

viewing multiple models. Traditionally, the models available until the 20th Century

would have been the teacher or other live musicians that the student heard elsewhere. As

sound recording became more accessible, vinyl records and radio supplied the student

with access to more models, both of which were auditory examples. Television and

movies increasingly added the visual element to modeling in the mid century, and by the

1980s videos were also enabling students to record and watch their own lessons or other

musicians. The World Wide Web opened the availability of multiple models, with sites

like YouTube supplying examples of most repertoire performed by professionals and

other students. YouTube was accessible from computer until recently, when smart

phones began offering access to video streaming. All of the participants in this study

used iPhones, iPods or iPads to stream from YouTube, as well as play audio recordings

for their students. IPhones recently have gained the ability to record video and students

were therefore able to record their teacher's example during the lesson for review later.

Underwood discussed his use of the iPhone.

In the 1980s when video started to be available, as soon as I had videotapes of
players I admired a lot of the things I teach came from what I observed from videos.
Now, having video so available on recording devices, like iPods and iPhones, allows
me to do any number of things, such as use video I have stored on my devices to point
out aspects of people's playing. Using videos that I have downloaded or are on the
web, or I play an exercise and they take little videos of me playing what I am

assigning them, you have the ability to record of a person's lesson. People can develop a little library of exercises, maybe not the whole lesson. You can demonstrate using a camera.

George stated that modeling was the most important part of teaching. She spoke about "demonstration" being effective because "we are much better with our eyes than with our ears." She also spoke about the aural aspect of modeling, as in teaching a child language. George spoke about her early teachers, Kincaid of the Philadelphia Orchestra, Mariano of Eastman School of Music and Baker of the New York Philharmonic. She contrasted their teaching styles, with Mariano and Baker teaching by demonstration and Kincaid by "illustration." George used recording and video devices, as well as YouTube examples for modeling, Alexander Technique and Body Mapping techniques and other traditional strategies in her teaching. She and others used the newer devices in addition to traditional strategies that were found in the literature review, using the newer strategies to complement. Underwood stated how much time he would use viewing models.

> The way I show people things is like two bars of somebody playing. I say, "This is what this guy sounds like" playing those two bars. I point out how their intonation is, how their tonguing sounds, I don't have listening sessions where I sit down and listen all the way through a recording. I just go a couple of bars at a time.

During Underwood's class at the Bloomingdale School of Music, Keith used an iPad to show videos of various examples. As he spoke about tongue placement in the 54th minute of the class, Underwood mentioned Hubert Laws playing Amazing Grace, and how his tongue came forward with every breath. The class spent between one and two minutes watching the video before Underwood continued to explain and demonstrate the concept.

There's this nice little video of Hubert Laws playing Amazing Grace. Watch his tongue (plays video on iPad) See his tongue. That's what I'm talking about. Every time he takes a breath his tongue comes out. (They watch video) That's not an attack through the lips. So he's going like (imitates). So you go (demonstrates Mozart). (Student plays) It keeps the sound from falling back.

Underwood recommended that the students watch another video of Julius Baker and then continued the class. At the one hour and 16 minute point in the class, Keith was instructing a student on vibrato, using speech syllables and demonstrating. He then used the iPad with the slow down application to give the student another model.

I put my slow downer on my iPad. Awesome, this is Julius Baker playing Bach sonata in e major. (They listen on iPad, he then slows it down) Do you hear the wow wow wow (Underwood sings with vibrato)? It almost sounds like a half step. (Sings Beatles tune "I am me and you are he and we are all together") (Continues listening to Baker slowed down, imitates) What I love about this is that that's exactly what its like. It's not like taking a tape and slowing it down. Having everything an octave lower, that's not exaggerated, that's the amount of pitch shift he's playing with. (Imitates Baker). When people play vibrato like (plays very nanny goat sound) its not real (student plays) Do it three times slow. (Demonstrates, student plays) Now do the B (Underwood plays). (Underwood plays beginning, student plays) Do the A (Underwood plays slow then up to speed), now the whole phrase (student plays) right, good. Now listen to this (they listen to iPad slowed down) I like it this way, much more relaxed. It's like an oscillation in volume. (Underwood plays example of both).

This example was played for between two and three minutes. Underwood recommended slow-down applications that the students could look for and gave a history of himself and of Julius Baker using slowed down recordings. Once more, at the one hour and 40 minute mark, Underwood played an example on the iPad with the sow-down application for about two minutes. The class ran for 2 hours and 40 minutes, so the use of recorded examples was very small compared to the total time of the class. At New

York University, Underwood spent the beginning 13 minutes of class discussing slow-

down applications. He told the history of his teachers' and his use of slowing down

recordings. He defended his use of slowing down devices.

> I caught a lot of flack for using the device like that when I started becoming well-known as a teacher because people thought that was very mechanical. Except that my students who had done those kind of things got into orchestras frequently.

The rest of the two-hour class was spent on other strategies. His class at New York

University on Dec. 8, 2011 began with a student playing a sonata and at the six minute

mark Underwood brought up a recording of Julius Baker to illustrate the rhythmic flow of

the piece and coordination with the accompaniment. This was an audio recording on

Underwood's iPhone, which they listened to for less than a minute. At the 16-minute

mark, Underwood again played the same recording to illustrate a lip position he was

discussing. They listened to this example for about a minute. No other examples were

played in this two-hour class.

The iPhone was used in Jones' private lesson and discussed during her interview.

Underwood discussed using the iPhone as he told a story about teaching buzzing to

another student.

> And the thing about iPhones is its one thing if you have a, speaking of utensils, a video camera. You could just ask if I could get a shot of you doing that, but its like interrupting things too much. But if I hold this and ask you to do it again I can just talk and look at the screen.

Later in Jones' lesson, Underwood played a video demonstration of his young students

using the coffee stirrer, Alexander Technique and buzzing. The total time spent watching

videos in the one-hour lesson was about three minutes. Jones discussed the use of videos

in other lessons during her interview. She was discussing Underwood's use of body

positions including Alexander Technique and models including Jean-Pierre Rampal.

> One thing that Keith has talked to me about recently has been changing my body position. We are using YouTube videos of Rampal as a tool. Keith said this is his new discovery of hw body position should be. Essentially I'm turning my sternum away from the flute so the sternum is going to the right. SO your sternum is going to the right but your head is going slightly to the left. Like Rampal with his little head tilt. That's helping me more than anything. It's amazing, I feel that the sound is so much more open and my back feels open in that position. Keith has me doing Rampal-esque head tilts and you would be surprised how much it varies the color of the sound. Just these little motions of your head actually vary the color. It may be psychological, sometimes I wonder about that, how much of what we do is physically effective or is it psychologically effective, but for me it works. Yeah, that's been helping me a lot. Also I feel like in that position my fingers feel looser and I don't feel hunched over the music stand. I feel very open. I guess it's a very French position to be in. Its also not tight, you are upright and your body is in an open position. You are still "cat backing" over in the position that Keith recommends. This has been helping me a lot. He just told me about this last week. We've been working on that this week and I think it's helping a lot. He seemed to think it helped my sound a lot last week.

Jones thought that the visual model of Rampal's head position was helping her with

her tone, combined with the Alexander Technique body positions she was practicing.

Underwood discussed the benefit of carrying so many recordings with him in his

interview.

> Recorded material is so portable now; I carry so many recordings with me that I have on my phone any piece that I am likely to be teaching. Thanks to YouTube if you have access to the Internet you can see people playing virtually anything that you're working on. In this era there is no excuse for people not to have heard a recording of the music they're playing. It used to be that you had to go buy the

recording or go to a library to hear it, but at this point you can hear recordings of everything for free.

Digital recording devices, combined with tuners, slow-down applications and video, were used as visual and aural models. The devices, and the availability of multiple recordings and ways to manipulate them quickly, were strategies that increased students' access to modeling, the dominant traditional teaching strategy.

Frequency of Strategy Use

The strategies nominated for study though observations and interviews were discussed in interviews regarding specific use at differing levels of instruction. Most strategies were used in the teaching of all student levels. The exceptions were the breath builder machine and spectral analysis. Underwood stated that the breath builder machine would cause younger students to hyperventilate. Christie said that younger students didn't understand what they were seeing on the spectrogram but she would reintroduce the strategy six months later when they might start being able to understand it. She used the strategy more extensively with advanced students. The other strategies were used by Underwood to teach students from the age of seven. Underwood was observed teaching several master classes and one lesson and the strategies he spoke about in the interview were sometimes used. Underwood used traditional strategies the majority of the time while teaching in all situations. Brown was also observed teaching a master class and used traditional techniques for the majority of the class. The observed lessons and classes involved three of the participants in interviews, Underwood, Brown and Jones.

The class and lesson formats are broken down by strategies used in order to give a profile of time and focus during the actual teaching circumstances.

Content of Master Classes and Lessons by Strategy

The class observation of Rachel Brown lasted for approximately two and a half hours. Topics discussed included tonguing syllables, phrasing, Baroque dance steps and the pneumo-pro device, which was discussed and used for about fifteen minutes at the end of the class. Tonguing was addressed using speech techniques, mostly using the discussion of various syllables to help with Baroque-style "doodle" tonguing. Phrasing was discussed with imagery relating to string bowing.

Underwood's class at New York University on Oct. 13, 2011 ran for two hours. It began with thirteen minutes of discussion on using recording devices with slow-down applications. The first student played for almost three minutes and Underwood then introduced the coffee stirrer/straw device, which he used alternatively with the student for the next ten minutes. The student played for almost three minutes and then Underwood showed another example using the coffee stirrer for about a minute. The student played for a few more minutes and then Underwood spent 17 minutes more explaining the strategy while alternating examples with the student playing. The next 7 minutes were spent on Alexander Technique and body positions. The next student played for two minutes and then two minutes were spent talking about tonguing. Underwood then spent two minutes speaking about a mouth position with the use of speech syllables "fuh" or "ffff" rather than "Hoo". The next ten minutes included alternating demonstrations and student playing of tone. Underwood then described mouth and jaw placement. Ten

minutes were spent on intonation and blowing less air. Imagery was used as Underwood instructed the student to have more "spin" on their vibrato. The next student's segment began with discussion on intonation and then Underwood concentrated on body positions as he alternated talking, with the student playing for sixteen minutes. The next student was instructed for a total of twelve minutes during which Underwood focused on changing her hand position. One mention of hand position made by Underwood was a reference to Alexander Technique principles, where he discussed taking the "pressure off the throat". Approximately 27 minutes of this class was spent on newer strategies, with the remainder spent on traditional strategies.

Underwood's class at the Bloomingdale School of Music lasted for approximately two hours and 40 minutes. Underwood spent the first segment speaking about tonguing, using description of physiology, and also demonstrating. The student played and then the entire class played an example together for a few minutes. Underwood then used speech syllables to explain tonguing ("huh huh huh") and demonstrated before having the whole class play again. He discussed Rampal's tonguing and imitated a former student's tonguing as a positive model. At around the 27th minute of the class Underwood played an example on his iPad. He then explained the example using descriptions of physiology and speech syllables. At the 29th minute of the class, Underwood had the entire class play a tonguing exercise, alternatively discussing speech syllables. The next ten minutes of the class were spent discussing tonguing using descriptions of physiology and speech syllables, alternating with Underwood demonstrating and the class playing. The next student played and Underwood focused on body position for ten minutes. Approximately

the next five minutes were spent on tonguing, where he described placement of the tongue. Underwood then told the story of Marcel Moyse spitting food as a kinesthetic example of tonguing. Underwood demonstrated and also sang an example of how not to pull the tongue back. He then spent a few minutes showing the class a visual model of basketball player Michael Jordan running with his tongue hanging out. He also showed a video of Hubert Laws on the iPad, telling the students to watch his tongue. Underwood played an imitation of the video and the student then played her piece again. Underwood discussed tongue placement for another minute and then asked the student to buzz a demonstration. She then played and Underwood buzzed with vibrato, asking the student to imitate. Underwood spent the next five minutes answering a question about buzzing alternating with demonstration. He also instructed the students on lip placement while buzzing and the whole class buzzed. The student played for another few minutes until the one hour and 11 minute mark of the class. The next student played a piece with a hard tongued passage. Underwood told a story about Julius Baker using the same style of tonguing, which he called "wamp." While instructing on the tonguing style, Underwood used speech syllables like "wamp.". For vibrato, he used "wow" and "huh" as models of what he preferred instead of "heh heh heh." This discussion and alternating playing by Underwood and the student lasted about four minutes until Underwood played an example of Julius Baker on the iPad. The next eight minutes were spent with Underwood playing examples and the student imitating, alternating with listening to the Julius Baker example slowed down on the iPad. Underwood spent the next nine minutes telling the history of himself and Julius Baker using slowed down recordings to learn how to imitate vibrato. At the one hour and 29 minute mark Underwood demonstrated and the student

played alternatively for about four minutes. Underwood mentioned Alexander Technique as a way to help phrase by using body movement. Underwood demonstrated the "wamp" idea and the class imitated several times for about ten minutes. Underwood mentioned the Alexander Technique idea of movement for phrasing and then began to speak about tonguing syllables. At the one hour and 44 minute mark in the class Underwood played another example of tonguing on the iPad and then gave new syllables for fast double tonguing. Underwood alternatively spoke and played example and the student and/or class played imitations for tonguing until the two hour and 8 minute mark. Underwood then spoke about vibrato, using speech syllables "wah wah," playing multiple examples for about 4 minutes. He then sang examples of vibrato with the syllable "doo doo," telling the class to avoid "doyg doyg." About 8 minutes were spent on this, with Underwood alternatively talking or playing examples. At the two hour and 20 minute mark Underwood played another example of tonguing on the iPad, which he explained using the imagery of "a ping pong ball bouncing." He played and spoke about the imagery for about 4 minutes and then spoke about tonguing syllables and the placement of the tongue, alternating with demonstration for another few minutes. The student played for a few minutes and Underwood spoke again about the placement and shape of the tongue for about two minutes. At the 2 hour and thirty minute mark in the class, Underwood spoke about vibrato speeds, played a few examples and mentioned using vocal technique, recommending a book by Cornelius Reid called the Bel Canto Principles of Practice.   The class ended at approximately the 2 hour and 40 minute mark. Approximately 32 minutes of this class was spent using newer strategies, the remainder using traditional strategies.

Underwood's class at the Mannes College of Music on December 7, 2011 included only one mention of a newer strategy. Two students agreed to be observed; the total time for both was about 40 minutes. The first student played a fast, tongued passage and Underwood spoke about tonguing syllables, preferring "luga luga luga" to "tik tik tik." Underwood used mostly speech syllables but also one description of physiology and several imagery statements. He spoke about "phantom tonguing" and played multiple examples, which the student imitated. At the ten-minute mark of the class Underwood mentioned finger breaths, relating them to tongue placement. The rest of the first student's segment of the class was spent on external embouchure and on tonguing using speech syllables, with alternating demonstration and student imitation. Underwood spoke again about internal physiology and used two more images, of "biting the air back" and describing the sound as "ringy-er." The second student played a piece on the piccolo. Underwood spoke about limiting the air, also using the imagery of "not biting down". Underwood spent a few minutes on vibrato, using speech syllables "yu yu yu" as preferred over "hee hee hee." The class ended with alternating demonstration and imitation of the idea of playing with less air while sustaining through a slow passage. This class included only one mention of a newer strategy, the finger breath.

Underwood's class at New York University on December 8, 2011 was observed for approximately one hour. The first 7 minutes of the class were spent with a student playing the beginning of a sonata. Underwood asked how the student was feeling the rhythm, in four or two. He then played and example of Julius Baker on his iPad for a few

minutes. Underwood then alternatively played and sang examples and the student imitated. He discussed the rhythm and suggested the imagery of a "biting" sound. About two minutes were spent discussing the external embouchure, alternating demonstration and student imitation. Underwood then instructed the student to play "with air in the cheeks" or "more cheeky." These statements were descriptive of internal physiology. He related this to external embouchure and played another example along with the recording of Julius Baker on the iPad. He discussed vibrato and played examples for two minutes, relating the idea of air in the cheeks to how Julius Baker sounded on the recording. The student played for another two minutes and Underwood then suggested to "float your ribs more." This was imagery probably related to Alexander Technique. The student played and they discussed coordination with the piano accompaniment for another few minutes. At the 24-minute mark Underwood again said to put air in the cheeks and that it would cause the tonguing to sound like a "ringy attack." Underwood spoke for two minutes about lowering the flute on the embouchure and again mentioned the idea of "floating your ribs because that will open up the sound." He also instructed the student to "think up when you're loud. Also think up as you are going down." These references to body positions were also images used to help the tone. He spoke of this body position causing the sound to be "cushioned." The student then asked a question about air speed and covering the embouchure hole. Underwood spent 4 minutes explaining how air speed and blowing angle relate, playing several examples. The student stated that this contradicted another teacher's strategy. Underwood spoke and played for another 5 minutes about this and then the student imitated. Underwood spent two minutes on tonguing style, using the imagery of asking for a "clean but more legato sound." He discussed external

embouchure placement over the hole and played examples with the student imitating for another 5 minutes. The rest of the class, about five minutes, was spent with Underwood speaking about and playing examples of the lower lip covering more of the embouchure hole. He spoke about the Joachim Quantz book, <u>On Playing the Flute</u>, in which Quantz remarked that most flutists play with the embouchure hole too uncovered. About 8 minutes of the class were spent on newer strategies; the rest of the class Underwood spent using traditional teaching strategies.

   Jones' lesson with Underwood on Oct. 13, 2011 lasted one hour. Underwood began the lesson discussing external physiology, which he described as "mentalis, the muscle in the chin." He then buzzed his lips and said that it created "more stability in the sound" by "bunching up the muscles in your chin." He described Jones' sound using the speech syllables "hooey". Jones called her sound "saggy." Underwood used the description of the chin muscles and the image of a "cave woman" to help the sound to "stabilize." He talked about using the chin and thinking of the speech syllable "ffff." He used another image of a "cave squirrel" or a "dorky cave squirrel." He also contrasted the f syllable as in saying the word "flute" to a "steamy version of ffff." He said that the "dorky cave squirrel" made the sound more "intense." At the five-minute mark in the lesson Underwood spoke to Jones about her hand position, with alternating demonstration and student imitation for about nine minutes. Underwood then began to explain buzzing, which Jones had never done, by describing where to place the tongue. He used the image of "spitting off the top of the tongue" and then demonstrated. Jones tried to imitate and was able to make a sound after a few minutes. Underwood alternated buzzing examples

with Jones imitating, adding tonguing and pitches to the buzzing. Underwood modeled

buzzed glissandos and arpeggios and also described loosening the lower lip. Underwood

then talked about another student buzzing and showed a video on his iPhone that he made

in that student's lesson. He played another video of the student playing a performance.

Underwood and Jones alternated modeling and imitating, with Underwood describing the

feel of the tongue in the mouth and how it changed shape for intervals. At the twenty

minute mark Underwood described the interior of the mouth and where the air was being

forced. He then asked Jones to use a body position, the "cat back," and told a story about

another student using this strategy. Underwood showed a video of another student on the

iPad, which they watched for about a minute. Jones played the flute and Underwood

asked that she "send your lower lip up into your top teeth." They discussed hand position

for another minute and then returned to the topic of buzzing. Underwood described a

voice student he taught the buzzing strategy to, combined with the "cat back." Jones then

played and Underwood asked her to "think of spitting off your tongue." They both

buzzed again and she played again. Underwood asked her to "spit off the top of your

tongue, keep your tongue as wide as your lip." The discussion of this image, as well as

the description of the width of the tongue, were then followed by more buzzing. At the

forty minute mark of the lesson Underwood described how the buzzing made it

impossible to over blow. "The thing that's really appealing to me is that the better you do

the buzzing you can't over blow." He discussed buzzing and the coffee stirrer "a relative

of buzzing" as strategies to limit blowing. He demonstrated using his fingers over his

mouth while buzzing and Jones imitated. Underwood spoke for about five minutes about

using iPhones to take videos of examples without interrupting the lesson. They discussed

using a coffee stirrer, which Jones described as also being used by a trumpet player she knew. At the 42-minute mark Underwood started teaching Jones to use the coffee stirrer. He demonstrated and she imitated or about five minutes. Underwood then played a video of his young students using the coffee stirrers. He also mentioned that he used the Alexander Technique strategy of "Monkey Position" and showed a video of a young student doing that. He then showed a video of a young girl using the finger breath strategy and buzzing. They watched the video for about two minutes. This lesson included a majority of time spent on newer strategies, with less than ten minutes spent on traditional strategies.

Categories of Newer Strategies

The strategies studied in part two of this research were used as models and images. Several of the strategies created kinesthetic models and were intended to teach the students a physical feeling to be applied to playing the flute. These kinesthetic models addressed aspects of the internal physiology of playing the flute, such as tongue placement, mouth shape and tongue movement or the speed of blowing. Vibrato, tone and tonguing were addressed through physical memory of these strategies or devices. Visual models were also provided by some of the strategies in the form of pictures of sound, the visible reactions of devices or the videos of performers' body positions. Imagery was provided by strategies in the use of body position descriptions in Alexander Technique, such as "float your ribs." Some strategies provided a visual as well as a kinesthetic model, such as the breathing bag, breath builder machine, pneumo-pro and the spitting of objects. Others provided a visual model such as watching a performer's body

position on video or analyzing a spectrogram. Some offered a kinesthetic and aural

model, such as the finger breath and buzzing. The Alexander Technique provided a

kinesthetic model and an imagery model. All of the strategies were reported to help in

the teaching of tone, tonguing and/or vibrato in some way.

Chapter VI

DISCUSSION

Introduction

This chapter will discuss and synthesize the results and findings of this study as related to previous research and scholarly writing. The chapter begins with an enlargement and completion of the conceptual framework that was initially created for the study to include newer strategies found as a result of this study. The addition of the newer strategies and participants' effectiveness ratings to the original conceptual framework will help to illuminate how the research questions have been addressed through this study. A more detailed discussion of the results and their relation to previous literature follows the section on the revised conceptual framework. The purpose for the study and the research questions as they were stated in chapter one are restated below:

Purpose of the Study

There is a need to understand how the general determinations of effectiveness found by researchers in studio music teaching can be specifically applied to the teaching of each instrument, and to the techniques that are unique to each. A need to inform best practice in the teaching of the flute requires study into the nature of strategies used to teach aspects of the instrument's technique that are internal. The purpose of the study was to

find out how teachers address internal aspects of flute technique, what strategies were being used to teach these areas and how flutists rated the effectiveness of the strategies being used. The study sought to determine how flute teachers were instructing students in areas that are not directly observable, such as in the placement of the tongue and in the shape of the mouth and throat and in vibrato. The study gathered flutists' measurements of the effectiveness of methods in an effort to gain empirical evidence of effectiveness. Also, an investigation into unique or exceptionally mentioned teaching modalities reported by flutists gained further insight into best practice and sought to enlarge the body of knowledge on teaching internal areas of instrumental technique.

Research Questions

1. What is the incidence of use of the following instructional practices in the teaching of internal flute techniques such as vibrato, throat and mouth shape, tonguing and tongue placement?

   > Verbal Description of:
   >
   > > Internal physiology
   > >
   > > Creative visualization/imagery
   > >
   > > Vocal/Speech techniques
   >
   > Visual Models of Anatomy
   >
   > Visual Representations/Pictures of Shapes, Colors or Places
   >
   > Teacher Modeling with Student Imitation

2. How do flutists perceive the effectiveness of these strategies?

3. Are some strategies for teaching internal flute techniques perceived to be more effective than others

4. What other strategies are being used to teach internal flute techniques?

The incidence of strategies used to teach internal aspects of flute technique was reported in the Results chapter, as were flutists' ratings of the effectiveness of the strategies. The Findings chapter discussed the other strategies named by participants that were investigated in interviews and observations. This chapter organizes the strategies into a more comprehensive conceptual framework and discusses how they fit into flutists' overall views on the teaching of internal aspects of flute technique.

Expansion of the Conceptual Framework

The Conceptual Framework in chapter one was comprised of strategies used to teach aspects of internal flute technique that were found in the literature. These strategies were all considered to be of equal value in a comparative study on flute teaching (Lancaster 1994). Other studies, which were either descriptive or comparative in nature, were done without empirical effectiveness ratings (Etienne, 1988) and also assumed the effectiveness of all described strategies. These studies and the methodological books on flute were the basis of the categories named in the conceptual framework: Visual models (both anatomical and evocative), verbal descriptions (of physiology, images and of vocal/speech techniques), and teacher modeling (also called demonstration). "Other" unknown strategies to be found in the course of this study were also represented in the conceptual framework. The "other" strategies nominated by participants in the survey (spectral analysis, the pneumo-pro, buzzing, Alexander Technique, finger breaths, recording and video devices, the breathing bag and the breath builder machine, straws

and balloons) were used to teach internal aspects of flute technique and thought to be effective by their users. This study sought to find the relative effectiveness of each traditional strategy as rated by advanced-level flutists, and to investigate and describe the newer strategies. Participants in the survey nominated all the strategies that were investigated qualitatively through interviews and observations. These strategies were reported to be used from as early as the 1980s (Alexander Technique) to around 2010 (pneumo-pro) and had not found their way into scholarly literature on flute teaching at the time of this study. The researcher found that many of the new strategies fit into traditional categories that already had been created in the original conceptual framework. Those strategies were in the categories of visual models, imagery and modeling. Two new categories of strategies were also created as a result of the findings: kinesthetic models and aural models. The categories are discussed and expanded below to include strategies found through this study.

Visual Models

The literature search found two types of visual models used for teaching internal aspects of flute technique, anatomical drawings (Fain, 2009; Walker, 1995; Nyfenger, 1986) and depictions of shapes, colors or places (Nyfenger, 1986; Hill, 1995). This study found similar and additional models that were visual in nature. Anatomical drawings were used by Alexander Technique practitioners in a technique called "Body Mapping" (Conable, 2000; Pearson, 2006), in which students were encouraged to understand the functioning of the anatomy with the assumption that such knowledge would result in better movement. While this assumption was probably no different than that of the previous strategies using anatomical drawings, the Alexander Technique also focused on

mental imagery, which will be discussed below under the category of Verbal Descriptions.

The other visual model found in the study that was similar to previous strategies was that of watching another performer, as in the strategy of teacher modeling and student imitation. Modeling has always been a dominant teaching strategy preferred by teachers in every musical discipline (Rosenthal, 1984; Duke & Simmons, 2006). The difference found in this study was the current state of common and accessible video use by students (on phones and computers) to record their teacher's example, and universal access to the Internet where students observed numerous performer examples on websites and on YouTube. The ability to easily access videos via computer or phone had increased the availability of visual (and aural) models, which were used for learning about posture as relating to tone, tonguing and vibrato. Hilary spoke about using videos of Rampal to learn a head position that was supposed to help her tone. While focusing on external posture using videos of performers was seen to help internal aspects of technique, this was reminiscent of earlier strategies that largely ignored discussion of the tongue, vibrato and mouth shape. The Suzuki Technique (Rea, 1999) relied almost exclusively on visual/aural modeling, other than the use of rice for spitting as an illustration of tonguing technique. Also, the Natural Learning Process (Kohut, 1992) relied heavily on modeling, although some imagery-based descriptions and illustrations were used to teach breathing. Learning from watching and listening were believed by participants in this study to be effective for teaching internal techniques, as had been found in the general studies on effectiveness in studio music teaching (Duke & Simmons, 2006). Outwardly visible

posture or facial appearances were believed to have an effect on internal structures. This use of multiple visual/aural models will also be discussed further in the section on teacher modeling.

Teachers used the devices investigated in this study to give additional kinds of visual models. The students used the device and saw the result of air use on the device. The reaction of the device was then used as a mental image that students kept in their minds while actually playing the flute. The use of the images was similar to those mentioned in the literature, when students were asked to picture a candle flickering (James, 2008), or an object spinning (Garner, 1998). Some teachers used the bow of a stringed instrument as a mental image (Krell, 1973; Peck, 1998). The difference found in this study was that the devices were unfamiliar visual models, where a candle, a spinning top or a bow were familiar. Instead of recalling a familiar object, the students were meant to interact with the devices in a way that simulated playing a flute. The teachers who used the breathing bag, breath builder machine and the pneumo-pro all sought to give a visual model of what the air should do while playing the flute. Users of these strategies believed that seeing the result of the air movement on a device was helpful for making positive change on the flute. The breathing bag was used to show the amount of air blown, the speed at which it was blown and the movement made by tonguing and vibrato pulsations. The breath builder machine was used to illustrate continuous air movement while blowing, breathing in, tonguing and making a vibrato. Alternatives that were offered, a plastic bag attached to the flute head joint and paper strips attached to the embouchure plate, all served similar functions. The pneumo-pro device was used to show air movement and direction while

blowing and tonguing, as did the alternative pinwheel. All of these devices depended on

continuous airflow, which was mentioned many times as being necessary for improved

tonguing, tone and vibrato. Davis spoke about how the air "stops" and students don't

realize it. Users of these devices believed that they achieved continuous airflow by

giving a visual example of a physical result of lack of airflow or achievement of airflow.

The breath builder machine contained a ball that dropped if airflow was not sustained.

The pneumo-pro or pinwheel fan would stop turning, although Rachel Brown had pointed

out that the pneumo-pro fans were not sensitive enough to react to gentle airflow. The

breathing bag or plastic bag attached to the head joint also provided a visual example but

were perhaps the least reactive to discern if air movement was maintained when the

breath was very slow. Spectral Analysis was used to give a visual model of the student's

flute playing as a spectrograph. The information available on screen included intonation,

volume (amplitude) and harmonic partials for each tone. Users of this strategy believed

that seeing a visual representation of these aspects of the tone was helpful for students in

learning how to make a better tone and vibrato. One reference to the use of oscillographs

was found in an out-of-print book on playing the flute (Stevens, 1967). These primitive

wave pictures were not widely used, although one participant mentioned this strategy and

the book in the course of this study. The waveforms were to be used to "…assist the

student to visualize what these differences are." (Stevens, 1967). The author

recommended that teachers use an oscilloscope, because without it "…the onus falls on

the audio-acuity of the student and teacher for developing the desired color spectrum of

the player." (Stevens, 1967) The author produced wave pictures and described how he

achieved them by use of the mouth, tongue and throat placements. Despite this reference,

traditional teaching did not embrace the oscilloscope. The oscilloscope was not found in other sources nor did other participants in this study mention it. Traditional teaching strategies relied on evidence derived from flute playing of intonation, vibrato speed and amplitude, tonguing quality, air speed and air continuity rather than depending on devices.

Verbal Descriptions

The three strategies teachers used that were based on verbal descriptions as found in the literature were: descriptions of physiology, imagery/creative visualization and vocal/speech techniques. Imagery was found to be the main component of the Alexander Technique strategy as it was investigated in this study. The users of this strategy asked students to imagine movements, balancing, and shapes of their anatomy in order to improve internal aspects of flute technique such as tone, tonguing and vibrato. The emphasis on movement also included discussion about the opposite and detrimental "locking" or "shortening" of the anatomy, as Davis called them. Alexander users discussed all areas of the body as relating to internal techniques, as in the directive to "widen" the shoulders and to "lengthen" the spine to help improve tone and tonguing. Davis spoke about the tongue, that it also should be "widened" but he stated that the users of this strategy believed it was better to address internal physiology "indirectly". The Alexander Technique has been described as a physical and philosophical practice in which "the Alexander lesson is essentially an exercise in how to learn." (Gelb, 1981). Its philosophy attracted many noted adherents, among them was educator John Dewey. As such, it is not surprising that practitioners would use a teaching philosophy encompassing both the physical and mental aspects of learning to achieve improvement in internal

techniques. Teachers have used directives concerning relaxation and posture in the literature and in practice almost universally, to the point that posture and relaxation were not included in this study as particularly focusing on internal techniques. Good posture and a relaxed stance were seen as obvious requirements to playing the flute, both pertaining to external and internal techniques.

Kinesthetic Models

Several of the strategies investigated in this study were used to give the student a kinesthetic model, or feeling memory, of a desired technique. It became clear during the interviews and observations that many of the devices and strategies were being used to simulate a desired feeling while playing the flute. It was decided that this was a strategy that deserved its own category because the kinesthetic learning was gained from a device instead of being learned by playing the flute. The only strategy in the literature review that had had a similar method of using an object other than the flute for learning was that of spitting rice or objects in order to learn tonguing (Rea, 1999; Louke & George, 2010).

Some of the newer strategies fell into both the visual and the kinesthetic model categories. These were the pneumo-pro (pinwheel and paper strips), the breathing bag (plastic bag) and the breath builder machine. The student was intended to remember both the visual aspect of the device and the feeling of blowing into the device while playing the flute. Specifically, the pneumo-pro/pinwheel/paper strips gave visual evidence of air direction and speed, which the student would hopefully remember kinesthetically when playing the flute. The breathing bag gave visual evidence of air speed, vibrato pulses and tonguing bursts, which the student would be intended to remember kinesthetically. The

breath builder machine gave visual evidence of continuous airflow while blowing, inhaling and also while tonguing and making a vibrato, which the student was intended to remember kinesthetically.

Several strategies gave kinesthetic feedback without a visual element. The finger breath strategy, straws and buzzing were used to address mouth shape, tongue placement and airflow. Buzzing was used for vibrato as well as tonguing, while the finger breath strategy was used for tonguing only. The straw was used for limiting the airflow during tonguing and legato blowing. The intentions of the users were for flutists to remember how tongue and mouth shape were achieved and how much air was used while employing the strategy and to then replicate those feelings while playing the flute. These strategies primarily worked kinesthetically and also had an aural element. The sound of the finger breath, straw ("like a sprinkler") and the buzz were used as proof that the strategies were being done in an effective manner and were practiced until the prescribed air sounds were achieved. Whistle tones, which were mentioned by Jones as an alternative to buzzing, also had kinesthetic and aural elements. Whistle tones were a traditional strategy used for embouchure placement, posture and relaxation (Nyfenger, 1986). The newer strategies that had genealogy in brass pedagogy were not mentioned in the literature at all, as their use in flute teaching is still limited and has some controversy surrounding it. Neither were the other strategies mentioned in the literature nor were alternatives found to the devices. The phenomena of using devices and brass-derived strategies appeared to be unique in the previous several decades and therefore no direct comparison with traditional strategies can be made.

Aural Models

Buzzing and the finger breath strategies had elements of aural modeling. The sound of the finger breath or buzz was supposed to establish that the strategy was being used correctly. Users of the buzzing strategy spent time achieving a desired buzzing sound and also alternated buzzing with flute playing in order to address mouth shape, tonguing and vibrato. Whistle tones, as an alternative to buzzing, were produced as proof of a desired mouth position. Traditionally, aural models have been in the form of a teacher or other performer playing the flute, and the student imitating on the flute. Whistle tones or harmonics have also been mentioned more recently in the literature (Nyfenger, 1986; Hill, 1995) as exercises to produce a desired embouchure (external mouth) shape.

Other aural models found in this study included the use of software to slow down recorded music in order to analyze the vibrato or tonguing. It was found that teachers used multiple videos and recorded examples for students to imitate, and also had the ability to slow down those models to give a more detailed aural model without changing the pitch of the playback. Several teachers talked about slowing down recordings to analyze the width and number of vibrato pulses or to discern tonguing patterns in fast passages. Students could also easily record themselves and slow down the playback to analyze themselves in the same ways. Traditional strategies began to include the concept of recording oneself recently as was described by participants in this study, however mention of students recording themselves was not found in the literature. This may be because self-recording devices were not commonly available until the advent of the cassette recorder in the 1970s, and because the quality of the recording and playback

could not be assured. Underwood discussed being recorded in lessons by Baker and Nyfenger, however the literature does not mention their use of recording devices. Listening to oneself on a recording is perhaps a newer strategy, in addition to listening to oneself slowed down.

Revised Conceptual Framework

Duke & Simmons (2006) stated in the conclusion of their study on studio teaching that that there was a need to study "precise methodologies" regarding strategies to teach particular instruments. This study sought to comprehensively name the strategies used to address internal aspects of flute technique and to gain flutist's views on their effectiveness. It is hoped that the revised conceptual framework created as a result of this study represents the current variety of flute pedagogies for addressing internal aspects of technique. The revised conceptual framework includes a new category named "Kinesthetic Models" and adds other new strategies to the appropriate traditional strategy categories where they fit. Aural models are included under the category of Modeling, revised from the term "Teacher Modeling" because of the finding that teachers and students used multiple recorded examples during this study. Alexander Technique has been placed under the category of Imagery. The completion of the revised conceptual framework includes the strategies that were found as a result of this study where "Other Methods" was placed in the original conceptual framework. It was decided that the strategies would be shown without hierarchy in the completed conceptual framework because they were all reported to be effective in some cases. The interrelation of the

strategies, the results of flutists' views on effectiveness, and the findings of the study of

newer strategies will be discussed below.

Teaching Strategies Addressing
Internal Aspects of Flute Technique

Visual Models:	Verbal Descriptions:	Modeling:	Kinesthetic Models:
Anatomical drawings, body mapping, drawings of shapes, devices, spectograms	Physiology, imagery/ Alexander Technique, vocal/speech techniques	Teacher or video/ recording, Slow-down software	Devices, finger breath, buzzing

Effectiveness of Strategy as Determined by Outcome for each student

Student does not display improved vibrato, tone and tonguing: try another strategy.

Student Displays Improved Vibrato, Tone, and Tonguing

Effective Teaching of External Techniques

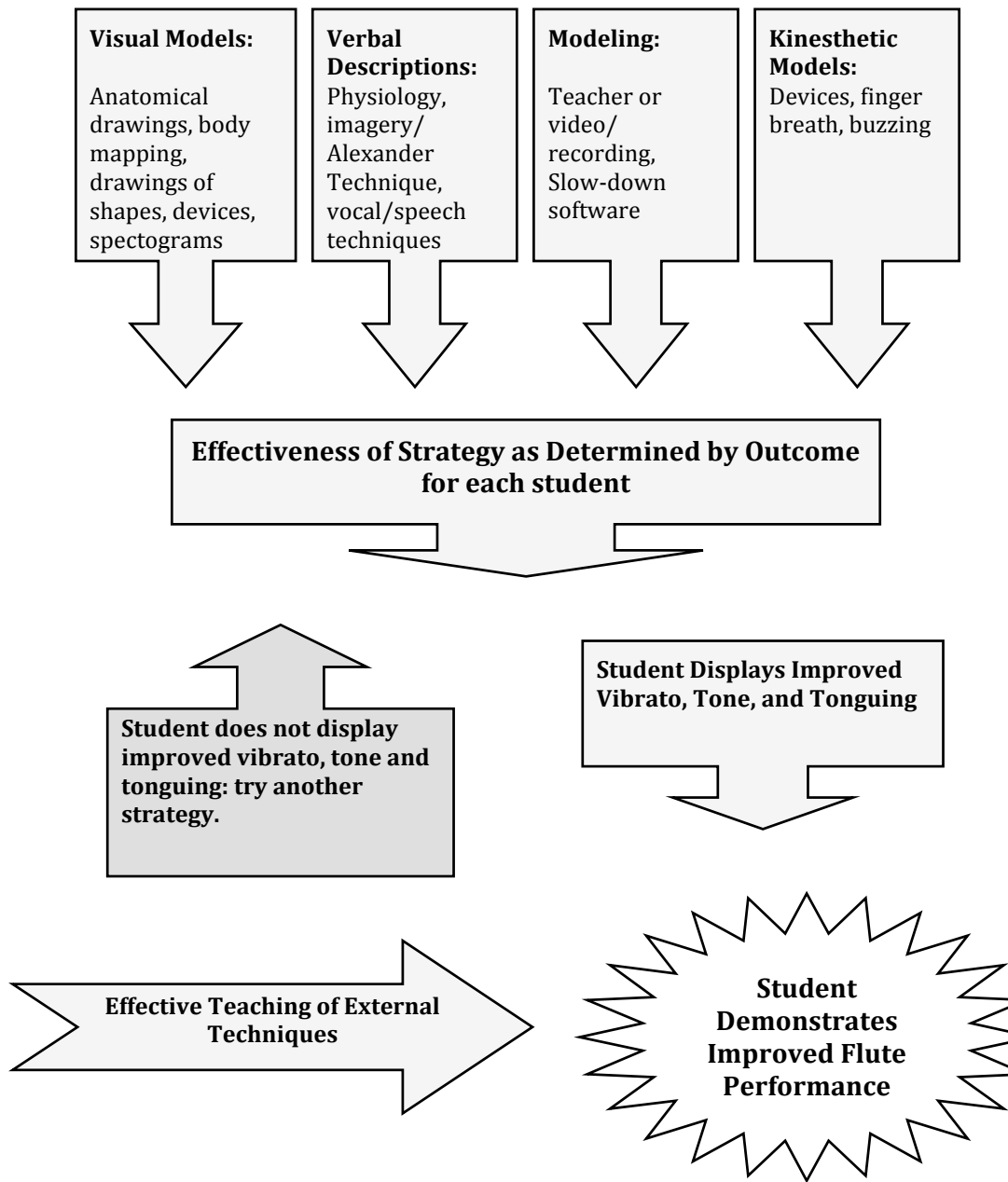**Student Demonstrates Improved Flute Performance**

Figure 12: Revised Conceptual Framework Image

Incidence of Strategy Use

The first research question dealt with the incidence of strategy use in the experiences of participants. The amount of flutists who stated that they had experienced devices or other strategies that were not listed in the survey was higher than anticipated. This reflection on current practice was somewhat anticipated by the researcher but not to the extent that the results showed. It was also interesting, but not as surprising, that the same four traditional strategies rated as most effective by participants were also the same as the most experienced by participants. Teacher modeling was both the most experienced and rated as the most effective strategy for teaching internal aspects of flute technique. The next most experienced strategy was that of verbal descriptions of internal physiology, however it was rated third in effectiveness. The third most experienced strategy was creative visualizations/imagery, which was rated the fourth most effective strategy. The fourth most experienced strategy was vocal/speech techniques. This was rated second in effectiveness. Although the order of three of the strategies changed slightly, it was notable that the most experienced strategies were also considered to be the most effective. The other strategies rated much lower both in experience and effectiveness.

The study's results may or may not reflect the current state of flute pedagogy relating to the teaching of internal aspects of technique as a whole, however the predominance of traditional strategies plus the significant experience and use of newer strategies suggests a reasonable picture of current practice. It was the experience of the researcher that most teaching reflected traditional strategies and that the newer strategies began to be used in

the last few decades. It was not known by the researcher if this was the common experience of other flutists and the results of this study seem to suggest that it was. This study sought to give a picture of current practice and that included describing newer strategies as they became evident. The newer strategies' places amongst traditional strategies will be discussed and integrated in the following sections. Validity and reliability of the study will be addressed further below.

Effectiveness Measures in this Study

The effectiveness measures in this study were based on the opinions of the highly trained flutists who took the survey in part one. Criteria for inclusion in this study ensured that the opinions expressed were those of flutists who had a minimum of entry into a college course as a flute performance major. Of the final number of participants who took the survey (159), most (132) were older than college age. The majority of flutists were professional, which ensured there were many years of experience behind the opinions stated. Participants were recruited through flute club magazines, the international flute electronic mailing list run by Larry Krantz of Syracuse University, colleagues of the researcher and through the College Music Society membership. Although the survey participants were anonymous unless they chose to contact the researcher after taking the survey, all had to agree that they were either flute performance majors or professionals who had been flute performance majors in college. Validity was sought through approaching flutists with high level of skills. Previous studies used student grades (Abeles, Goffi & Levasseur, 1992) or professional status (Duke &

Simmons, 2006) to ensure the validity of responses. It was believed that the level of

participants in this study created a similar measure of validity.

Response rates decreased as the survey progressed, and not all participants answered

every question. Answers were forced in the consent and qualification pages in order for

participants to proceed. The rest of the survey did not force answers, meaning that the

response rates differed for questions or sections. Responses decreased during the survey,

with the last question answered by 106 participants. It was not known if the same

participants who had not completed the survey returned later and restarted, so there could

have been duplicate results due to multiple visits to the survey.

Part two of this study was an investigation into the newer strategies named by

participants in part one, which was intended to ensure that the newer strategies also had

some validity. Sixty-seven of the respondents to the survey question (53.20 % of those

who answered) had used "other methods such as equipment or devices to improve

vibrato, tone or tonguing". The researcher was surprised that so many of the respondents

had experienced other strategies that were not found in the search of the literature but the

relatively recent use of these strategies may have accounted for the lack of literature

about them. Suggestions for strategies given by participants were followed up unless

they were not understood, as in the comment "Use the force, seriously!" or if they

seemed harmful, as in the comment to "place your head in a bucket of water." The

researcher made an effort to investigate all suggestions, categorizing them as the

investigation revealed similarities. The researcher included cheaper alternatives to

equipment and devices, as they were mentioned by participants, and categorized them in analysis with their more expensive alternatives.

Effectiveness of the newer strategies was believed by their users to be in evidence because of the high level of achievement of the strategies' users. This is similar to the measures used by Duke & Simmons (2006), who selected the teachers they studied based on educational awards. Underwood taught a the Mannes School of Music, New York University and the Aaron Copland School of Music, CUNY, as well as internationally in master classes. He commented that he had been criticized for using his slow-down strategy, but that many of his students got into orchestras. The other participants had high credentials as well. Davis taught at the University of Minnesota, Brown taught at the Royal College of Music, and Gudmundsen was completing her Doctorate of Musical Arts at the University of Minnesota. LeGrand taught at Campbell University and Jones was a Masters student at New York University. The users of spectral analysis were scientists who also taught pre-college level flutists and were active in performance.

Researcher's Entry into the Study of Controversial Strategies

Part two investigations were qualitative in nature and the researcher endeavored to be a non-participant observer as much as was possible. Kennell (1989) spoke about the lesson as an "unstated hypothesis," and the researcher intended to observe the strategies without adding pressure on the teachers to prove the effectiveness of their strategies, but this may not have been entirely possible. All participants knew that a particular strategy was being observed and may have felt compelled to prove its worth.

The researcher knew that there had been some controversy expressed in the past about some of the newer strategies, as was stated by George, Jones and Underwood, particularly those that came from brass pedagogy. The researcher believed she had gained entry into studying the controversial strategies because of having previously studied with Underwood. It was felt by the researcher that this would lessen any defensiveness about the strategies and was seen as a benefit to this research. In this way, the researcher was somewhat of an insider. Also, the researcher had been exposed to some of the strategies in earlier forms and found that their use had evolved since that time. The researcher had been exposed to the breathing bag, breath builder machine, finger breath, buzzing, and Alexander Technique. It is possible that flutists known to the researcher would have been more likely to take the survey and volunteer to participate in observations and interviews, which could have resulted from the researcher's previous exposure to some of the strategies. The researcher had sufficient volunteers on the strategies she had previously encountered and fewer volunteers on the strategies she had not experienced, possible reflecting a sense of a "school" of playing surrounding each of the strategies.

Effectiveness of Newer Strategies as Taught to Different Audiences

In general, lessons and classes that were observed included more of the traditional strategies than they did the newer strategies. Brown used the newer strategy for a few minutes in a class that lasted several hours. Christie reported that she used spectral analysis briefly and occasionally with her students. Others spoke about using the

strategies in particular settings. Underwood sometimes used the newer strategies in his

observed classes, depending on the student make-up of the class. His classes at New

York University and the Mannes School of Music consisted of students from many other

teachers, and the Bloomingdale School of Music Class consisted primarily of adult

amateur students. Underwood used the brass-related pedagogies (buzzing, finger breath,

breathing bag and breath builder machine) most often with his own students and with the

adult amateur class. This may have reflected the formation of this hypothetical new

"school," the controversial nature of the strategies or have been the result of a courtesy to

the other teachers. He spent a significant part of a class at New York University assuring

a student, after she expressed concern, that the mouth shape he recommended did not

contradict the mouth shape that was recommended by her teacher.

Risks

The possibility existed that students learning new strategies could have felt pressured

or coerced to use them and to either trust implicitly that they worked, or to agree to use

them in order to get a good grade from the teacher. Jones was studying through New

York University at the time of this study and could have been under pressure to accept

and embrace strategies taught to her by Underwood, at least temporarily, however her

comments in the interview indicated that she was modifying the strategies in her own

practice, while also thoughtfully articulating an understanding of the controversy behind

them. She said she used the buzzing technique more as a "check up" and that she didn't

think it was necessary to spend a lot of time on it. It would be interesting to interview her

again after she has finished her study to update her ongoing ideas about the new
strategies.

The users of the strategies investigated in part two all believed in the effectiveness of
the strategies so there is a risk that by descriptively reporting them that more credence to
their effectiveness was given than was due. It is hoped that discussing the strategies in the
context of the initial survey and literature review would balance any unintended
weighting given to the newer strategies because of the study's mixed-method format.

Genealogies of Newer Strategies

Brass-Derived Pedagogy

The strategy users named by participants in the survey were found to have interesting
educational genealogies. It was found that the users of the breath builder machine, the
breathing bag, buzzing and the finger breath strategy had learned them through a
connection to brass pedagogy. Underwood, Davis and George mentioned Arnold Jacobs,
former tuba player with the Chicago Symphony, as the one who had used these strategies
with the brass players who then taught them to Underwood and Davis. Davis also studied
with Underwood. LeGrand studied with Underwood and Gudmundsen studied with
Davis. Jones studied with Underwood at the time of the study. Anonymous respondents
had recommended that the researcher contact Underwood and Davis, while LeGrand,
Gudmundsen and Jones had volunteered to be participants in part two of the study. All of
these players, therefore, had a connection to the same teaching genealogy or "school."
Jones mentioned that Underwood had received negative feedback about his strategies

from other teachers and on the Internet possibly reflecting that this particular "school" of teaching is in some ways less common and not mainstream. The researcher proposes to classify such brass-derived pedagogy as a school of teaching and will call it the "brass-derived school of flute teaching," including the strategies of buzzing, finger breaths, breathing bag and breath-builder machine.

Imagery Schools

The Alexander Technique was used by many of the members of the brass-derived pedagogical school and also by George and Christie, who did not use the other strategies representative of this "brass-derived school." It would seem likely that Alexander Technique is not associated with the other brass-derived strategies, as neither were the pneumo-pro or spectral analysis. Instead, Alexander Technique was used as an over-all body awareness, relaxation and postural strategy and was intended to benefit internal techniques secondarily. The language used by Alexander Technique users was considered to be important in the image it created for students. Directives to "widen," to "lengthen" or to "think of your neck moving back" were given to help posture, induce relaxation and to give the student something to think about secondary to the issue being addressed (tone, tonguing, or vibrato). Underwood referred to using precise language in both brass-derived pedagogy and Alexander Technique and the importance he believed language had in creating the right image. Davis stated that it was impossible to change certain physiological movements by thinking about them specifically and that they had to be changed "indirectly."

The use of imagery to help students to relax and effect positive change on their instrument is reminiscent of earlier movements. The use of Zen-inspired techniques in sports and music were popular in the 1970s and were described in and inspired by the Inner Game books on tennis, motorcycle maintenance, archery and music (Herrigel, 1953, Gallway, 1974, Pirsig, 1974, Green, 1986). Also, a similar self-awareness style was evident in the writing of Eloise Ristad in her descriptions of helping students to eliminate tension (Ristad, 1982). In Ristad's description of the voice student who became the title name for her book, <u>A Soprano on her Head</u>, Ristad instructed the student to stand on her head and sing a selection she had not been able to sing before. The next step was helping the student to understand what had changed in her technique while standing on her head and to then transfer the positive change back to an upright position. Alexander Technique seemed to similarly require students to think about movement and their bodies separately from the task they were trying to achieve on the instrument. George also said that she liked to use yoga and Feldenkreis, another postural strategy similar to Alexander Technique. Brown said she used yoga but she and George expressed concern that yoga could cause harm to students without proper training and attention to the wrists.

New Invention: Pneumo-pro

The pneumo-pro was suggested anonymously in the survey and the researcher therefore had to find someone who used the strategy. After unsuccessful attempts to locate someone through the New York Flute Club, New Jersey Flute Society and the flute electronic mailing list, the manufacturer of the pneumo-pro was contacted. Kathy Blocki, who had a patent pending on the pneumo-pro at the time of this study, wrote to the researcher to give the background of previous models of her device and to invite the researcher to purchase related materials and to come to a training session. The researcher did not buy materials or attend training due to the expense, nor did she buy the device. Blocki also gave the researcher names of two British flutists who were at that time using the device. Rachel Brown, who was the only one who responded to an invitation to be included in the study, had been using the device for less than two years. She said that it was available in London music shops as of 2011. Although the device was fairly new in its current form it had already become available internationally, possibly due to its effectiveness and good marketing. The videos on the pneumo-pro website showed that it was in use by Kathi Blocki and another American flutist who was a student at Northwestern University at the time of filming. The Blocki training program offered certification in the pneumo-pro's use. Brown was using it at the time of the study with students at the Royal Conservatory of Music in London and with younger students she taught at a boys school. The device had not been available very long and so it will remain to be seen if the device becomes more popular. The price of the device and the certification process along with written materials may become prohibitive. Brown and

George spoke about cheaper alternatives to the pneumo-pro (using a pinwheel and blowing up and down onto the hand or onto one's hair).

Scientist/Flutists

Spectral Analysis was also suggested on the survey anonymously. The researcher used the electronic flute mailing list to find participants. Two American professors of flute corresponded with the researcher stating that they had used spectral analysis to teach college level flutists in the past, but they declined to participate in the study. In March of 2012, the editor of the New York Flute Club newsletter, Katherine Saenger, held a demonstration of spectral analysis at the New York Flute Fair. The researcher was able to assist Saenger for the day and experience how Saenger initially introduced the strategy. Saenger and another assistant were both highly trained flutists who were employed as scientists. Saenger, who has a PhD in physics, was working for IBM as a researcher at the time of the study while giving workshops in spectral analysis to students on weekends. The other assistant was a professor of physics in a New York City area university. Both were also performing as flutists and had high levels of skill. The researcher was also contacted by another scientist, Tina Christie, who was using spectral analysis in her teaching while working fulltime as a software engineer. It was interesting that all the participants in this study who used spectral analysis were also employed in the sciences. George, who was not a scientist, stated that she had previously experimented with oscillographs, but that she would not use spectral analysis. It seemed that those with a real interest in spectrographic representation of sound were scientists as well as flutists. Christie used the spectrograms as teaching tools in basic acoustics and to instruct advanced students in tone colors. George said that it was more useful to use the ear,

which was a comment other flutists had casually made to the researcher during the course of this study.

Visualization of the Flute

Most of the newer strategies studied were attempts at making the internal aspects of flute technique visual. The most challenging aspects of learning to play and of teaching the flute are the necessary and invisible aspects of tone production, tonguing and vibrato. It is no wonder that efforts to "see what the air is doing" as Davis remarked, are predominant in the newer strategies used to teach internal aspects of technique. Wind players have tried in the past to see inside their bodies, using dangerous x-ray films, or attempting to play with a fluoroscope in the mouth (Patnode, 1999), but these have not been safe or practical. The strategies studied ranged from those needing no equipment, as in Alexander Technique, the finger breath and buzzing, to expensive devices as in spectral analysis, which requires a computer and software. Strategies were based on devices that show the air; the breathing bag (plastic bag), breath builder machine, pneumo-pro (pinwheel) or paper strips, or strategies that show a body position, such as Alexander Technique and watching videos of performers. There seems to be a need to give a visual model for that which is internal, to make the flute more like a string instrument, where all techniques can be seen. The effect derived from seeing a result is consistent with previous research that found modeling to be the best teaching strategy. Previous studies found that the teacher playing an excellent example (Duke & Simmons, 2006 and Kennell, 1989) was indicative of effective teaching. This study was engaged in because there are aspects of flute technique that cannot be modeled because they are internal. The users of many of these new strategies have attempted to create visual

models. There seem to be enough users of the brass-derived school to indicate that there is some validity to these approaches. The pneumo-pro is too new to have a lasting genealogy of users yet. Spectral Analysis seems to have a smaller following who are interested in the sciences.

Kinesthetic Models

Many of the visual models also had kinesthetic properties. While watching the result of the air on a device, the student was directed to remember how it felt to get the desired outcome. The desired outcome on the bag was smooth inflation and gentle undulations from the movement of the tongue. The breath builder machine used a ping-pong ball that reacted to the airflow, tonguing and vibrato. The ideal airflow and tonguing stroke were achieved when the ball was maintained in the up position. The student was then directed to blow the same way on the flute. The pneumo-pro provided a visual model of air movement and direction that were to be remembered kinesthetically and transferred to the flute. Straws seemed to provide purely a kinesthetic model, after students were instructed how to place the straw in the mouth and what sound the blowing should make. The feeling of air resistance while blowing and tonguing through the straw was then to be replicated while playing the flute.

The cheaper alternatives to the breathing bag and the pneumo-pro, a plastic bag, paper strips and a pinwheel, operated similarly. Students were taught to combine a visual and a kinesthetic memory to transfer to the flute. Other strategies with less of a visual element had kinesthetic and aural models. The buzzing strategy had a visible model aspect available in the shape of the outside of the mouth, and the rest of the strategy was based

on the sound of the buzz and on the feel of the inside of the mouth while making the buzzing sound. Students were shown and listened to the teacher modeling the buzz. Once the buzz was achieved, the students were instructed to remember the feeling of the mouth and tongue when playing the flute. The finger breath strategy was similar, with a small amount of the strategy observable as the student held the hand to the mouth and opened the mouth in the instructed shape. Otherwise, the sound of the finger breath was used to discern the proper shape of the inside of the mouth and use of the tongue.

Aural Models

Aural modeling has always been practiced in the teaching of musical instruments, however the addition of newer technology has expanded this area. The ability to hear multiple excellent examples quickly and easily on a computer, tablet or smart phone has greatly increased modeling examples available for students to imitate. Also, the applications available that slow down recorded music have added another dimension to aural analysis and modeling. It was possible for students in this study to slow down and analyze any recording, including one of their own playing. Every student at the New York University flute class had a smart phone, the majority being iPhones, and they were able to access and slow down thousands of recordings. Underwood used a tablet in his class at Bloomingdale School of Music and at New York University to play examples and to slow them down. This innovation was comparable to the impact that the tuner had on the prior generation, giving students the means to evaluate their intonation objectively.

Modeling Effectiveness

All of the previous studies on effectiveness in studio music teaching discussed teacher modeling, as defined by the teacher playing an example for the student. The other teaching strategies that were found in the literature and in the current study can be seen as efforts to create other kinds of models for students. It can be interpreted that music teachers create models for students using descriptive, visual, aural, kinesthetic or imagery-based strategies.

The function of the teacher is to enable the student to improve their performance by using whatever model is helpful to that student. Effective teaching on the flute takes into account the innate internal aspects of technique and seeks ways to enable students to develop those areas. The discovery of newer strategies that address these internal techniques is not surprising because there would be a need to address this part of flute playing in multiple ways. Kennell discussed the need for teachers to have multiple teaching tools in their toolbox, and these newer strategies increase the tools available for teachers. The hypothesis of their effectiveness is tested by the teachers' and students' use of the strategies. Hopefully, the strategies would have been devised based on sound anatomical principals, as George stated, "everything must be medically based." The Spillane study unfortunately showed that teachers were still using impossible anatomical directives, mistakes that could have been easily corrected in this era of unlimited information. It may be that a strategy could still work despite being based on unsound ideas of anatomy, in which case the strategy was effective based on imagery and not on an understanding of anatomy. Patnode (1992) showed that players achieved a high

playing level while describing their tongue placements incorrectly. Again, this may be
due to a use of imagery, as in imagining the tongue to be in a certain position while it is
in another position. This model would work effectively as imagery if the student did not
attempt to enact the directive literally. It may still be effective when used in ignorance or
its impossibility, however it would still be effective as an image. Successful use of
mistaken anatomical directives was not part of the current study.

All Strategies as Imagery

The researcher began to see a similarity in all of the strategies studied. It began to
appear that as a teacher provided models to students, the models, of whatever form,
created images in words, feelings, ideas and pictures. Earlier studies and literature
showed that teachers historically discussed the outside of the mouth, posture, hands and
rarely the internal structures. Tonguing was based on language types and pronunciations,
a language-based model for tongue movement. Etienne (1988) discussed preferred
languages for better placement of the tongue, but non-speakers of those languages would
have to learn them to gain the benefit of the language image. Others like Debost
(Lancaster, 1994) approached vibrato as "a matter of feeling". Clearly there have always
been images used to teach internal flute techniques, they have increased and entered new
areas such as the kinesthetic and visual, but imagery can be said to be the basis of most
teaching. The student may be the final determiner of how each strategy is translated into
an image. Students may use the same strategy and learn from it individually by using a
different form of imagery. Hill (1995) instructed students to "picture" the vibrato and to
"will" it to happen. Students could think of an actual picture from a spectrogram, a line
drawing, and an image of a violinist or their favorite flutist when creating a "picture" in

their mind. Or they could imagine a breathing bag vibrating, or a strip of paper moving.

Those images would then enable the student to "will" the vibrato to happen.

Flutists in this study rated traditional strategies, most preferring the imagery they

received from teacher modeling, vocal/speech techniques, verbal descriptions of internal

physiology and imagery/creative visualization. Others derived benefit from the images

created by the newer strategies. The researcher believes that it is the responsibility of

teachers to use the models that will help each student, which may mean that they have to

keep a large "toolbox" of strategies (Kennell, 2002) in case they need them. This belief

will be discussed further below and under the section on recommendations in the final

chapter.

Preferred Strategies

Modeling (and imitating the teacher's example) was rated the most useful strategy for

teaching internal aspects of flute technique, followed by references to speech syllables or

vocal techniques. Verbal descriptions of internal physiology, and imagery or creative

visualization were then rated the next most useful strategies. The other strategies that

were found in the literature were rated lower and they were not used as frequently.

Fewer method books contained pictures of the inside of the mouth, tongue and throat or

images of sound shape and none contained references to the devices nominated by

participants, other than the strategy of spitting rice. Although most flutists preferred the

traditional strategies, a majority had also experienced newer strategies and some believed

they were effective. The results of this study show a ranking of effectiveness in

strategies. When respondents related their views on the traditional strategies when applied to internal techniques on a five-point scale, there were clear majority opinions expressed for each strategy. These ratings were used to create a proposed hierarchical order of strategies for addressing internal techniques and are discussed below.

Minority Views

It was found that there were a significant number of survey participants who used newer strategies and believed in their effectiveness. The views of those who expressed the opinion that strategies had a negative effect were noted as well, although they were few in number. The researcher noted the opinions concerning possible undesired effects of the newer strategies on students. The low percentage of respondents who reported a negative effect from the newer strategies was encouraging, however devices consistently gained the most negative responses. This showed evidence of the controversy spoken about by George, Jones and Underwood concerning devices. In part two of the study, devices came to be defined as anything from a recording device to brass-derived devices such as the breathing bag. Underwood reported controversy surrounding his use of slowing down recordings. Jones reported controversy surrounding the buzzing technique, which is not a device, however it is one of the brass-derived strategies associated with devices such as the breathing bag and the breath-builder machine. George reported that the devices were useful for brass players but that she didn't believe they were useful for flute because of the differences in blowing technique and embouchure formation.

Modeling

Teacher modeling was found in this study to be the preferred strategy for addressing internal techniques regardless of the lack of visual evidence available to students. This preference may reflect the reason that previous research (Duke & Simmons, 2006; Kennell, 2002) and traditional teaching strategies (Etienne, 1988) largely ignored internal aspects of technique, as did the more modern Suzuki method (Rea, 1999). Julius Baker, as well as many teachers from France, avoided describing the internal processes involved in playing the flute (Ragusa, 2004). Modeling of the desired sound was the most important guide for traditional teachers, as it was for flutists in this study. It is interesting to note that one of the contemporaries of Julius Baker was an exception to this tradition. Thomas Nyfenger (1986) was one of the few flutists to include both anatomical and non-anatomical drawings in his book, Music and the Flute. Participants in this study rated the strategies using visual models of anatomy and images lower for effectiveness in teaching internal techniques. Nyfenger was the teacher of Keith Underwood, who in this study was found to be the key figure in what could be called the brass-derived "school" of flute teaching. This school used devices and strategies to create visual and kinesthetic models of internal techniques, which were also rated overall in the survey as less useful in teaching internal techniques.

It seems that the majority of flutists can use the top-rated strategies (modeling, vocal/speech techniques, description of internal physiology and imagery) and never need to use the lesser-rated strategies. Clearly, enough students have achieved high levels of

playing to assume that modeling (teacher or other source), vocal/speech techniques

(depending on the technique addressed), verbal descriptions of internal anatomy

(assuming it describes the anatomy correctly) and imagery/creative visualization are the

most effective strategies. The available literature offers a comprehensive body of

knowledge and numerous excellent pedagogical approaches for teaching these traditional

strategies. At the same time, there seems to be a need for some flutists to find other

strategies that create other types of models for internal techniques. Teachers have

devised these newer strategies, one could assume, because some flutists needed other

strategies in order to improve. Alternative ways to teach and learn are a positive

development in education as long as those strategies are effective. It is highly likely that

some students benefit more from kinesthetic models, newer forms of imagery or other

newer models than they do from traditional approaches. The reasons for the newer

strategies' development could have been varied and based on the experiences of

individuals who benefited from experimentation. Efforts to find new and different

teaching strategies are to be applauded. It may have been acceptable in the past, and it

may still be for many teachers, to exclusively teach using traditional strategies, however

there may be instances where these tools don't enable particular students to improve.

There have been circumstances where it did not matter to educators if students were not

progressing using a standard curriculum because those students would fail and then be

eliminated from instruction. The fiercely competitive environment in many music-

learning institutions increased the likelihood that students who did not progress using

traditional teaching strategies would be eliminated either at the time of admission or

sometime during their study. This may have been seen as a valid way to reduce the size of classes, acknowledging the competitive nature of the music field as a whole.

Recently, democratic and learner-centered approaches to education have changed teaching practices at many levels of instruction. Teachers are more inclined to encourage and meet the educational needs of students. Brown discussed with enthusiasm how she could get anyone to make a sound quickly on the flute by using the pneumo-pro. Traditionally, students can take weeks or months to establish a sound on the flute, leading to discouragement and uneven abilities in a class, further discouraging students. Brown was happy that students would be able to advance more quickly by using the device, and that their parents could also help the students by also being able to quickly make a sound on the instrument. Brown was not interested in eliminating students or allowing them to drop out due to discouragement. The brass-derived school of flute teaching, as described in this study, descended from Arnold Jacobs' teaching, which was based around helping brass players who had problems with their playing. George, in her interview, described Jacobs' students as top-level players who suddenly developed problems. The popularity of Jacob's strategies in the brass world seems to have expanded beyond players who were experiencing difficulties and have entered the mainstream of teaching pedagogy (Stewart, 1987). This is in evidence because the brass players who taught their techniques to the flutists in this study were all high-level players employed in orchestras or as teachers.

Similarly, examples of the use of strategies in the current study included Underwood discussing players' problems and his solutions using brass-derived strategies or

Alexander Technique. Other users of newer techniques spoke about helping students.

Davis spoke about students being "locked up" and LeGrand spoke about students needing

to be "coordinated". Gudmundson spoke about Alexander Technique helping with

nervousness. George spoke about straws keeping students from over blowing. One

could classify these strategies as being reparative, remedial or corrective and as such they

have a current place in flute pedagogy because of modern educational thought on student-

centered learning. Teachers have become more responsible for finding ways to help

students instead of eliminating the students who could not learn using traditional

approaches. The music field remains competitive, however reducing the number of high-

level students is not a solution to the problem of too few jobs. While it could be argued

that students would be better off giving up music more easily and entering other fields,

this argument does not address the fundamental belief that learning music is worthwhile

regardless of future job prospects. It may still be acceptable for teachers in high-level

training institutions to disregard the individual learning needs of students because other

students could easily take their places, but this thinking is beginning to be seen as no

longer defendable.

Students who seek alternative teaching strategies, other than the traditionally top-rated

strategies, can currently find many newer strategies used by high-level teachers. The

effectiveness of those strategies needs to be judged by the students, and it is hoped that

their cost would not become prohibitive. Nor would a proliferation of gimmicks and

false-claims be beneficial to students. It would seem best to proceed with caution and

introspection while using a newer strategy, as Jones showed in her use of the buzzing

technique. It may be that the strategy is valid for some users but that for others it does not evoke the model or image needed to effect positive change in that student. This has been true of the traditional strategies and of earlier strategies such as the oscillograph (Stevens, 1967) and is why teaching variety has always existed. Although traditional strategies were largely occurring in three categories (visual, verbal and modeling), variation amongst teachers has always existed in how the strategies were presented. The effectiveness of the strategies has not been questioned in previous studies while comparisons and contrasts were noted (Lancaster, 1994).

Proposed Teacher Modeling Hierarchy

The results of this research suggest a hierarchical effectiveness rating scale for strategies addressing internal aspects of flute playing. Respondents' ratings in the survey ranked their preferred strategies as shown in the following list. The newer strategies are included and indented but they have not been surveyed for effectiveness yet. The researcher proposes that some newer strategies be placed under the existing strategies, as discussed earlier in this chapter. These are indented below but were not included in the survey, therefore their placement in the hierarchy is hypothetical.

Descending Order of Preferred Strategies with Sub-Categories

1. Imitating the teacher's example

    a. Imitating videos or recordings

2. References to speech syllables or vocal techniques

3. Verbal descriptions of internal physiology

4. Imagery or Creative Visualization

    a. Alexander Technique

5. Using Diagrams of internal physiology

    a. Body Mapping

6. Devices or equipment

    a. Pneumo-pro/pinwheel

    b. Breathing bag/balloons/plastic bag

    c. Breath-builder machine

    d. Recording devices/video/slow-down software

    e. Straws

7. Pictures evoking the desired sound

8. Other strategy

    a. Alexander Technique/Feldenkreis/Yoga

    b. Spitting rice

    c. Paper strips

    d. Spectral analysis

    e. Buzzing

    f. Finger breath

    g. Aural models: recording, slow-down software

    h. Kinesthetic models: buzzing, straws, breath-builder machine, finger breath, whistle tone

Summary

The flutists who rated traditional strategies for addressing internal aspects of flute technique by survey were clear across questions about their preferences. They also offered suggestions of newer strategies that were being used to teach these aspects of technique by reputable teachers. As such, the participants of this study have added to the body of knowledge on current flute teaching practice and have offered valuable alternative strategies for students who need them. The completed conceptual framework reflected this new knowledge gained to answer the research questions. It appeared that the traditional teaching strategies written about in the literature were still the preferred strategies, however enough people also used newer strategies to imply their effectiveness. The researcher was known to some participants, which could have encouraged them to take part in this study by association, and so the newer strategies need further objective study. On the other hand, several strategies were unknown to the researcher, or had been used unsuccessfully by her in the past. The researcher proposed a hierarchy of teaching strategies that could be used to inform teaching practice, however the newer strategies and categories created by them need empirical study before they can be included with confidence.

Chapter VII

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter summarizes the results and findings of this study and discusses implications derived from the study and the researcher's recommendations. The chapter begins with a summary of the research purpose as it related to previous literature and to the study's methodology. The results that addressed the research questions are then summarized and are followed by discussion of possible alternative interpretations, the researcher's conclusions on the study and recommendations for future research and for teachers.

Summary of the Study

Research into effectiveness in music teaching has begun to address the unique teaching situation of the private studio lesson. Studies have begun to look at the qualities of effective teaching as broadly related to studio instrumental teaching. Many qualities of effectiveness in studio teaching have been named, however there have not been studies addressing specific teaching practices related to individual instruments. Nor have there been studies that rate effectiveness of strategies related to each instrument's technical specifications. The flute has many elements of technique that are produced internally that are therefore invisible. It is necessary to seek to understand how teaching strategies

address internal aspects of flute technique and to begin to assess what is effective for teaching techniques that cannot be observed. This mixed-method study sought to address this need by using the teaching strategies found in the literature as the basis for a survey seeking flutists' ratings of the effectiveness of the strategies for teaching tonguing, vibrato and throat/mouth/tongue shape. The search of the literature found that descriptive studies on flute teaching, method books and other books on the flute contained strategies that could be grouped into three broad areas: visual models that could be anatomical or representative of shapes, colors or other images; verbal descriptions that related to internal physiology, imagery or vocal/speech techniques; and teacher modeling with student imitation. A fourth category of "other" strategies, including devices, was added to the survey in order to gain a broad perspective of respondents' use of and views on newer strategies. It was assumed by the researcher that more strategies would be found as a result of this survey because of personal and anecdotal experience in the field.

One hundred and sixty flutists, who were either current or former flute performance majors, answered survey questions and rated the traditional strategy categories as they address internal aspects of flute technique. They were also given the opportunity in three open-ended questions to add effective newer strategies to be studied in part two of the research. The results from the survey indicated that respondents preferred teacher modeling with student imitation, the use of vocal and speech techniques, verbal descriptions of internal physiology and imagery/creative visualization as their most preferred strategies in that order. The preferred order of the first four strategies changed only slightly when respondents answered questions relating to specific techniques. The

use of anatomical drawings or other visualizations, as well as the category called "other methods" (including devices) was rated lower in all parts of the survey.

Participants' suggestions of newer strategies were investigated for the second part of the study using observations and interviews of seven participants who either volunteered or who were nominated on the survey. The areas studied were: Spectral Analysis, devices including straws, pinwheels, a new invention called the pneumo-pro, the breathing bag, the breath builder machine, recording devices, brass-derived pedagogy including buzzing and finger breaths, and the use of Alexander Technique. It was found that a minority of flutists used these strategies but that their effectiveness seemed to be valid based on the high professional ranking of their users within the music industry. The newer strategies were indicative of additional teaching strategy categories. These additional categories were described by the researcher as kinesthetic models including many of the brass derived strategies and devices, imagery strategies that used verbal description of visualizations including Alexander Technique, and aural modeling categories that used video, recording or slow-down software to create playing models. The researcher's model-based description of teaching strategies proposes that both traditional and newer strategies employ models of various kinds to aid learning internal techniques. The researcher found that there were four main categories of modeling that teachers used in this study: modeling by played example, visual modeling, verbal modeling through description, and kinesthetic modeling.

Answering the Research Questions

Participants' effectiveness ratings of traditional strategies, as reported in the survey, produced a snapshot of current teaching practice addressing internal aspects of flute technique. One hundred and thirty-four respondents, out of the one hundred and fifty-nine flutists who began the survey, reported their experiences of traditional strategies.

Research Question One

Research question one, which sought to determine the reported incidence of strategies, was initially addressed in general questions that related to all internal techniques. The incidence of experiences of strategies were reported in the following order: teacher modeling, descriptions of internal physiology, creative visualization/imagery, vocal/speech techniques, visual representations of pictures/shapes/colors, visual models of anatomy, devices that aid learning and "other method not listed".

More detailed questions followed to assure the accuracy of the general answers reported above. Statements were reworded in an attempt to avoid possible misinterpretation of terminology. Participants' experience of strategies and the more detailed statements were rated in descending order of frequency: Most respondents reported that they "have experienced teacher modeling for the purpose of improving vibrato, tone or tonguing in the student." Second rated was the statement, " have experienced the reference to speech syllables or to vocal/singing technique to improve vibrato, tone or tonguing." Third rated was the statement, " Have experienced the use of

verbal descriptions of the internal physiology of the mouth throat or tongue to improve the production of tonguing, vibrato or tone." Fourth rated was the statement, " have experienced creative visualization or imagery to improve tone, vibrato or tonguing." The lower rated statements referring to traditional strategies found in the literature were, "have experienced the use of drawings that artistically evoke a desired "shape" of sound produced by vibrato, tonguing or tone" and "have experienced the use of anatomical diagrams to assist in the teaching or learning about internal physiology related to vibrato, tonguing or general mouth/throat/tongue shape." The lowest rated statement representing newer strategies (not found in the literature) was, "have experienced other methods such as equipment or devices to improve vibrato, tone or tonguing." The rated order of the more detailed statements was similar to that of the previous general questions, although vocal/speech strategies were reported more often when the detailed statement was rated.

The incidence of strategy use that was reported in the survey showed a similar snapshot of teaching practice that was found in the literature review. Teacher modeling was universally discussed in the literature and was the dominant strategy used by teachers such as Julius Baker (Ragusa, 2004) and Jean-Pierre Rampal (Cohen 2003), and was the basis for instruction in flute method books (Wye, 1985). The Suzuki Method (Rea, 1997) and the Natural Learning Process (Kohut, 1992) were based on teacher modeling as the dominant teaching strategy. Also, research into teaching effectiveness found that modeling was in general the most effective teaching strategy (Rosenthal, 1984). Excellent performance models were also considered to be indicative of excellent teaching in other general studies on effective studio music teaching (Duke & Simmons, 2006).

Descriptions of internal physiology were also commonly found in the literature, as were creative visualization and examples of speech and vocal technique. The least experienced strategies were also found to be the least mentioned in the literature, particularly the use of devices. Overall, the respondents' experiences of strategies mirrored what was found in the search of the literature. The participants' reported experience of the strategies was also found to be similar to the order of ratings they gave for the strategies' effectiveness, which are discussed below.

Research Question Numbers Two and Three

Research questions number two and three sought to learn how flutists perceived the strategies' effectiveness and to find if there were some strategies perceived to be more effective than others. To understand how flutists perceived the effectiveness of these strategies, a general question was followed by more detailed questions. The order of strategies participants found to be the most useful for inclusively teaching vibrato, tonguing and mouth/throat/tongue shape (the general question) was reported as follows: Firstly rated was "imitating the teacher's example," followed by "references to speech syllables or vocal techniques," "verbal descriptions of internal physiology" and "imagery or creative visualization." Next rated was " using diagrams of internal physiology." The lowest rated strategies were, "equipment or devices," "pictures evoking the desired sound" and " other strategy." The flutists' ratings on effectiveness mirrored the strategies they had experienced and those that were found in the literature, with minor variation. The detailed questions that were rated on a five-point scale gave more detailed information on flutists' ratings.

A five-point rating scale was used for each of the general questions on the effectiveness of strategies inclusively for vibrato, mouth/throat/tongue shape and tonguing. The order or majority preference (highest percentage of ratings) under the heading of " Very Effective" were "imitating the teacher's example," " references to speech syllables or vocal technique" and " imagery or creative visualization." The majority rated no strategies as producing a "negative effect" or as being "not effective" in this section of the survey. The order of ratings for effectiveness in the scaled question resembled both the order of experience of the strategies and the order given in response to the general question on usefulness of strategies. Verbal descriptions of physiology rated somewhat lower in this section, however the top four strategies experienced and rated most effective remained the same across all answers. The following section contained more detailed statements as referring to specific internal techniques and elicited similar responses. Each internal area was addressed separately in order to find if certain strategies were more effective for some internal areas than others. The strategies' reported effectiveness is discussed for each internal area.

Tonguing. Respondents reported tonguing to be addressed very effectively with a slightly different order of strategies. The order of ratings in the "Very Effective" category began with "use of speech syllables for the tongue" followed by " imitating a desired sound" and " teacher modeling of tonguing." This elevation of speech syllables to the top rating occurred only in the category of tonguing. Modeling was represented in the next two ratings, followed by " use of speech syllables related to mouth shape," " use

of speech syllables for throat shape" and "discussion of the shape of the mouth, throat and tongue." It is understandable that tonguing would elicit top ratings for the use of speech syllables because articulation is loosely related to speech. Under the rating of "Somewhat Effective" respondents clearly separated vocal technique from speech techniques, which were rated in the "very effective" category. This seems to show that speech techniques were rated highly for tonguing but that vocal techniques were not seen to be as effective in this area. No strategies were rated by the majority as not effective or having a negative effect.

The order of preferred strategies related to tonguing was similar to the general ratings order, however different statements regarding the use of modeling, speech syllables, vocal techniques and visual representations elicited more specific information about the respondents' view of the strategies. For instance, the use of speech syllables for the tongue were most often found to be very effective, above modeling or imitation. This is seen universally in the literature on flute playing and was also studied comparatively based on pronunciation related to spoken language (Etienne, 1988). Vocal techniques relating to resonators were rated as much less useful, separating vocal and speech categories into two distinct ratings. Imagery was reported as more effective than pictures of internal anatomy, however discussing the shape of the mouth, throat and tongue were seen as very effective. This could be explained because the discussion of a shape of internal structures creates an image, and imagery was reported to be very effective. Feeling of the inside of the throat, tongue and mouth, the descriptions of images or feelings and speaking about colors or emotions were seen as somewhat effective.

Pictures of the nose, throat and inside of mouth were rated neutrally by the majority of respondents, as were other vocal techniques involving resonators and the use of devices. This may explain why only some of the literature referred to vocal technique as being helpful for flutists, as it was not found in most of the literature. Anatomy such as the nose, throat and the inside of the mouth were not thought by participants to be as related to tonguing as the tongue itself. It was interesting to find that devices were used by some teachers for tonguing practice in the second part of the study since the ratings showed that a minority of respondents would see a device as being very effective to address tonguing.

Vibrato. The strategies rated by the majority of respondents as "Very Effective" were: "teacher modeling of vibrato" and "imitating a desired sound," which were both essentially the same strategy of modeling. The next three strategies also rated "Very Effective" were: "use of speech syllables relating to mouth shape," " use of speech syllables for vibrato" and " use of speech syllables for throat shape." These three strategies are all in the category of speech techniques, again showing that respondents differentiated between speech and vocal techniques, which were rated lower. In the rating category of "Somewhat Effective," verbal descriptions of anatomy and imagery and vocal techniques were represented, as were visual models of shapes. Describing the internal physiology, as well as using imagery, were found to be somewhat effective, as were vocal techniques, in addressing vibrato. It is understandable that descriptions of anatomy and vocal technique would be used to address vibrato because of the common use of vibrato in singing. There are also many ideas in the vocal field about how to

produce vibrato, which is done internally both in singing and flute playing. It was therefore surprising that vocal technique was considered only somewhat effective for vibrato, although the literature mostly described vibrato with imagery and did not recommend the actual practice of singing. Imagery relating to vibrato was found in much of the literature, where teachers referred to feelings and emotions ((Pintner, 1998, Wye, 1985). It is understandable that pictures were rated "No Opinion," because vibrato is created by movement while pictures are static. The devices low rating in this category was evidence of the minority of devices used to address vibrato. To summarize respondents' rating on vibrato strategies, modeling and imitation were rated first, followed by the use of speech syllables. Speech techniques and imagery were then rated higher that verbal descriptions of internal physiology and vocal technique. Speech and vocal techniques were regarded separately in this category as well as in the tonguing category.

Mouth/throat/tongue shape as affecting tone quality. The next ratings were given concerning strategies that address the shape of the mouth, throat and tongue as these affect tone quality. This was studied as distinct from effects of the embouchure, or outside of the mouth, on tone quality. In the category called "Very Effective," the majority of respondents rated: **"**imitating a desired sound," " use of speech syllables for mouth shape," " teacher modeling of throat/mouth/tongue shape," **"**use of speech syllables for tongue shape" and " use of speech syllables for throat shape" as the top five strategies. These statements represent the categories of modeling and the use of speech techniques. Also rated by the majority as very effective were: "discussion of the shape

of the mouth, throat and tongue" and " describing the feeling of the mouth, throat or tongue" which were verbal descriptions of anatomy and imagery. Vocal technique was rated as somewhat effective, a lower rating than speech technique once again. When reporting the effectiveness of strategies relating to mouth, throat and tongue shape as affecting tone quality, respondents adhered to the order of strategies they reported in the general question area, with the exception of again splitting speech and vocal techniques into two ratings. Vocal techniques rated lower than speech techniques addressing all aspects of internal technique. The detailed question area of the survey showed that there were minor variations in flutists' ratings of the strategies when addressing specific internal techniques, and that speech and vocal techniques should be studied separately in future. This was somewhat surprising because speech and vocal techniques both appeared in the literature, however vocal techniques appeared less often. Flutists discussed vocal technique as being helpful to flute playing in the literature (Walker, 1995, Mather, 1980), however flutists rated vocal techniques only as "somewhat effective." Not all flutists can sing or are familiar with vocal technique so this finding was understandable from that perspective, however the relationship between vocal technique and flute playing needs further study to determine how useful it is universally and for what areas of flute technique.

Additional Strategies Currently Used

Research Question Number Four

The final research question asked what other strategies are being used to teach internal flute techniques. It was found in this study that participants were using several categories

of strategies that were intended to create imagery models, visual models, kinesthetic models and to enhance teacher modeling opportunities with aural models. Several strategies produced models in more than one category. The genealogy of some of the strategies could be traced to brass pedagogy. The researcher proposed categorizing brass-derived strategies together because of their historical use with brass. They also seemed to have generated some controversy because they came from brass instrument pedagogy and flutists disagreed on their application to flute. Some flutists argued that brass instruments are played differently and their strategies are not effective on the flute. The additional strategies investigated in part two of this study, including brass-derived pedagogy, were not compared for effectiveness to traditional strategies by survey but rather were researched descriptively and need more study in the future.

Newer Models

The researcher proposed that the newer strategies investigated in this study belonged in both traditional model categories and in newer proposed categories. The traditional model categories found in the literature were: visual models, verbal descriptions and teacher modeling. The newer strategies found in this study that created visual models were: the breathing bag (plastic bag or balloon), breath-builder machine, pneumo-pro (pinwheel or paper strips) and spectral analysis. The newer strategy that created an imagery/creative visualization model was the Alexander Technique. The newer strategies that created a proposed category called kinesthetic models were: the pneumo-pro, the breath-builder machine, the breathing bag, finger breaths, buzzing and the spitting of rice or other objects. The newer strategies that created aural/visual models and

enhanced modeling opportunities (previously called teacher modeling) were: video including web-streaming and slow-down software. None of these newer strategies had been found in the literature, although mention of an earlier device similar to the spectral analyzer (the oscilloraph) was later found in an out-of-print text (Stevens, 1967). An alternative to the devices for practicing tonguing, the spitting of rice, was mentioned in earlier texts (Louke & George, 2011, Rea, 1999). Alternatives to Alexander Technique were not mentioned specifically in the texts although relaxation was often mentioned. The use of brass-derived techniques on the flute is fairly recent, as are the newer technologies for video and web streaming. The use of recording devices was not found in the literature even though personal recording has been possible since the 1970s.

Genealogy of Strategies

The brass-derived strategies, a proposed category named by the researcher, included: the breathing bag, the breath-builder machine, finger breaths and buzzing. These were mentioned in the brass literature (Stewart, 1987) but not as applied to flute playing. Experiential, imagery-based movements (Zen-based, Inner Game or other relaxation-based strategies) of the 1970s (Green, 1986, Ristad, 1982) were related to the increased popularity of Alexander Technique as a non-direct teaching method. The use of spectral analysis seems to have grown out of past use of oscillographs and the current availability of sound-analyzing software. The use of slowing down recordings and the use of multiple video examples has also grown out of the explosion in the availability of recordings, video, software that slows down recordings at correct pitch, and a high level of access to the web for video.

Alternative Findings

The researcher considered possible alternative interpretations of the findings during all stages of the study. This consideration began as the researcher formed the survey questions based on feedback on terminology from professional and student flutists. The power of word choice became evident as the researcher gained feedback on the proposed terminology of questions. While it became necessary to choose phrases to be used with consistency in the study, the researcher was concerned some participants might have misunderstood the terminology. This concern led to the researcher creating secondary, more detailed questions within the survey that she hoped would ensure that the participants understood. Although this seems to have been effective because the answers differed little according to the phrases used, there still was a possibility that meanings were unintentionally directing participants to choose certain answers. The researcher looked at several sources on survey writing and came to the conclusion that it was impossible to totally avoid researcher effects on survey wording. This is because a researcher chooses the topic, organizes categories and seeks information based on a personal interest or bias reflecting his or her perspective (Rea & Parker, 1997). Member checking, participant checking and advisors can only moderate this bias. The researcher did seek feedback and advice from multiple sources to lessen the personal biases as much as possible. The researcher also used self-checking throughout the study, examining her attitudes and feelings about the data as they became evident.

One alternative interpretation that occurred to the researcher was regarding the fact that traditional teaching strategies were the ones most available and experienced, possibly leading participants to believe that they were most effective. This could have happened because the high-level flute players who took the survey were the people for whom traditional (and most available) strategies were effective. The students who did not find the traditional strategies to be effective probably would either have not progressed to a high level of playing or would have quit. If alternative strategies, that would have helped the non-successful flutists, were unavailable then they would not have proceeded to higher levels of playing. Because of this probability, asking those who succeeded with traditional strategies whether those strategies were effective understandably elicited positive responses. The survey may have therefore been unintentionally stacked towards results that favored the traditional strategies. In the same way, those who used the newer strategies believed that they were effective, and while they represented fewer numbers in the survey, the newer strategies were reported to be important in those individuals' development into higher-level players. Ratings comparing the traditional and newer strategies for effectiveness may not be relevant if some players truly needed the less popular strategies in order to proceed to higher levels of playing. All the survey tells us is that the traditional strategies are in use more often, not the relative importance of any strategy in a particular flutist's development.

The researcher constantly considered another alternative finding that related to the newer strategies. Some strategies involved purchasing equipment and receiving training in order to use the equipment. It is possible that some individuals sought to create a niche

market within the music-teaching field in which to capitalize by selling equipment and/or training. There is a fine line between entrepreneurship concerning a valuable and helpful tool and unnecessary marketing creating perceived need. It was unclear from the limited amount of contact with the marketed devices whether they were really useful enough to justify their expense and the training needed to use them. The researcher heard opinions from colleagues that doubted this, and within the study there were many cheaper alternatives given for expensive devices. It would be unfortunate if marketing preyed on vulnerable students, who were seeking ways to advance possibly because the traditional strategies they were using were not leading to the improvement they sought. There is a risk that vulnerable students be taken advantage of in a way that benefits niche marketers without offering real benefits to the students. This is a risk in all areas of education, so it is important not to rush into using unproven strategies that claim a quick fix. Time and more research will tell if all the newer strategies investigated in this study will prove to be valuable enough to warrant their continued use, even though they received recommendations from high-level players.

Limits of the Research

This research was limited in various ways. The pool of participants in the survey who answered any one of the questions was at best a snapshot of a cross section of advanced flutists, and most were professionals. Advanced students represented only 9.60% (14) of those who started the survey. Participants did not answer all questions in the survey, and it is not known if anyone retook the survey subsequent times. The anonymity of the survey meant that the demographic of participants was not known. Also, it was

impossible to know what affiliations participants had and so the researcher assumed a balanced reporting from diverse backgrounds. The difficulty in gaining participants who were students was surprising, as the researcher had assumed that students had more time to take surveys than did professionals. It may have been that professionals had more interest in the topic. The second part of the study was limited geographically, although using Skype and the phone helped to mitigate that fact. The use of Skype, telephone and conferencing software, while helping to gain more participants, limited the interaction of the researcher and participants, and in some cases interrupted the flow of the observations and interviews when there were technical difficulties.

Recommendations for Further Research

This study was only a first effort to compare strategies for effectiveness. The researcher recommends further research into effectiveness of strategies that would compare the newer strategies with traditional strategies. This would be useful in survey format and also in observations and interviews. Also, more student involvement in future study is recommended. Vocal technique, as applied to the flute, also needs to be studied separately from speech techniques because participants rated them differently in the detailed question area of the survey.

The newer strategies' use needs to be reexamined over time to find if they are proving to merit inclusion with traditional strategies in the toolboxes of flute teachers. Some points of possible study are outlined below:

Recording, Video, Electronics and the Internet

The electronic availability of multiple-models is an interesting area that would merit further study, as students look to the Internet in addition to their teachers for modeling examples. The use of technology in general will continue to impact teaching, not only in video and recording but also in slow-down applications that allow students to dissect played examples at correct pitch. The use and application of spectral analysis ability as it becomes more advanced will also deserve further study.

Brass –Derived Strategies

The brass-derived strategies as applied to the flute have become more widely used and therefore more specific study of their reported usefulness needs to be done. This applies both to the use of devices associated with brass pedagogy, including the breathing bag and breath builder machine, and practice techniques such as buzzing and finger breathes.

Devices

All the devices investigated in this study need to be studied further, in order to compare their effectiveness with cheaper, simpler options and to assess their overall effectiveness to decide if they warrant the time and expense needed to learn to use them. Comparisons that need further study include the pneumo-pro/pinwheels and other techniques for blowing up and down, the breathing bag and balloons or plastic bags, the breath builder machine and straws, paper strips or finger breaths and buzzing.

Imagery, Body Position and Relaxation Strategies

The impact of relaxation, body movement and posture on playing instruments needs more study, possibly as related to sports psychology and medicine, as well as physical therapy for injury. A comparison of Alexander Technique, which was discussed in this study, with other movement-based strategies such as Feldenkreis and Yoga and study into their usefulness in addressing all aspects of instrumental technique would be suggested.

Inter-Category Comparisons

More detailed study within each category of strategies would clarify what strategies are most effective. Strategy models were investigated in this study as general categories but specific techniques were not compared within the categories. Traditional strategies that could be studied within categories would be the effectiveness of specific speech syllables for tonguing, vibrato or mouth shape, the comparative effectiveness of using different performance models, the types of anatomical descriptions used or images evoked, and the kinds of anatomical or evocative images provided. Other comparisons that would be useful would be the pneumo-pro compared to pinwheels, paper strips and blowing up and down on the hand, the breathing bag as compared to a plastic bag or a bag attached to the head joint, the finger breath as compared to the breath-builder machine etc. This study was limited to creating broad categories of strategies and further research needs to establish comparative effectiveness within the categories.

Other Suggested Research Areas

Another area deserving future study is the effect of individuals' preferred models on choice of effective strategy. Teachers may be able to target strategies for internal areas of technique more quickly if students' preferred models were known: visual, kinesthetic, verbal or aural. These could be compared to other literature on learning styles or modes, brain research and personality research. Also interesting to study would be the effect of using incorrect anatomical directives for teaching internal techniques, and whether their use can be effective as imagery tools regardless of their factual errors or whether they confuse students. Other topics relating to internal aspects of technique would be good candidates for future research, such as the effectiveness of vocal technique and ability on flute playing quality.

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Summary of Recommendations

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It was recommended that more study be done on the newer invention of the pneumo-pro and other brass-derived devices to assess their relative benefits compared to cheaper or free alternatives. The researcher observed the possibility that while most high-level flutists found traditional teaching strategies the most effective, that a minority of flutists have benefited from the newer strategies. It is therefore recommended that teachers investigate alternatives to traditional strategies in cases where students could benefit from another method, rather than allowing students to discontinue playing because traditional strategies did not produce improvement. It was also noted that the majority of flutists surveyed had been taught using traditional strategies and that fact may have accounted

for their high rate of success using those strategies, where unsuccessful students would have discontinued. The newer strategies may indeed have a high rate of effectiveness in all students if they were used routinely and therefore need to be studied further to assess their effectiveness.

Recommendations for Teachers

The researcher sought to create guidelines for teachers based on this study's data concerning the effectiveness of strategies addressing internal techniques on the flute. The survey did show that flutists believed they were using the strategies that were most effective. Also, the researcher sought to add to the literature on flute teaching by describing current practice, which included newer strategies that were less used than traditional strategies. While describing newer additions to the toolbox of strategies being used by some noted teachers, the researcher hoped to have begun a discussion on their usefulness that will engage future researchers and teachers. The motivation of this research was the better understanding and the application of strategies toward the often-mysterious aspects of internal flute technique.

The researcher recommends that teachers note the comparative effectiveness of the strategies as a basis for teaching prioritization. Also, the researcher recommends an attitude of openness to the possibility that a student may find other, lesser-rated strategies most effective. This means acknowledging that learners are successful when they use the strategy that they find most effective. Teachers need to increase their knowledge of strategies available to teach internal aspects of flute technique. Recognizing our own

limits as teachers is also important, as we seek to increase the amount of strategies we have available as teaching tools, or alternatively to direct students to other teachers who have those tools. The researcher recommends self-reflection on the part of teachers, to understand that students are motivated when their preferred learning models are used, which could mean at times using lesser-used strategies. Prejudice, factionalism and suspicion should not be the basis for judging whether a lesser-used strategy is effective for a particular student. Experimentation and observation over time with prudent management of risk will enable teachers to judge the usefulness of newer strategies as they emerge. The researcher recommends keeping an open dialogue on newer strategies alive in the literature. It is hoped that we as teachers will inspire and help students to improve by applying the strategy they find most useful for addressing internal techniques. It is also hoped that a concern for students would be the primary inspiration to broaden our teaching perspectives in order to benefit the most students.

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APPENDIX A

Biographies of Participants

Kathryn Blocki

Kathryn Blocki was a member of the Fort Wayne Philharmonic, Chautauqua Festival Orchestra, and a soloist with the American Wind Symphony and Elkhart Symphony. As a past faculty member of Goshen College, she taught flute, flute choir, and aural music skills. She graduated with high honors from IU Bloomington, Indiana School of Music and highest honors from ASU, and has had the privilege of studying with Eric Hoover, James Pellerite (past principle flutist with the Philadelphia Philharmonic), Samuel Baron, (past Julliard School of Music Prof.) and Bernard Goldberg (past principle flutist of Pittsburgh Symphony). Currently, she serves as a member of the National Flute Association's Pedagogy Committee. Publications include the *Blocki Flute Method Book I and Teacher's Manual* (winner of the NFA Newly Published Music Award): *Blocki Flute Method Book II with Teacher's Manual and Ensemble Book*, & *Syrinx: Rhythmic Teaching Edition* (licensed through the Theodore Presser Co). In 2008, she published two new duet books for the beginning and intermediate student. She is also the creator of the *Great Beginnings for the New Flutist DVD*, and patent holder for the Pneumo Pro Wind Director (a flute training tool). Before writing the Blocki Flute Method, Kathy received grants to study Suzuki Flute, Kodally, Orff and Dalcroze.

Information about Kathryn Blocki was taken from her website:

http://www.blockiflute.com/

Rachel Brown

Rachel Brown performs on a wide range of flutes and recorders. After training on modern flute at Manchester University and the Royal Northern College of Music with Trevor Wye she won the American National Flute Association's Young Artist Competition. As a soloist Rachel has recorded extensively and toured in Europe, Japan and North America. Rachel has had a long and distinguished career as principal flute with Kent Opera, the Academy of Ancient Music, the Hanover Band, the Kings Consort, Collegium Musicum 90, Ex Cathedra and the Brandenburg Consort. She is author of the Cambridge University Press handbook to The Early Flute and has composed cadenzas for the new Bärenreiter edition of the Mozart Flute Concertos and has published two volumes Quantz sonatas.

Information about Rachel Brown was taken from her website:

http://www.rachelbrownflute.com/

Tina Christie

Tina is employed by Sentel Corporation as a software engineer and is a flutist and flute teacher. She currently teaches at Forte Music Studios and has been a faculty member of the Rappahanock Summer Music Camp in Fredericksburg, Virginia. Tina performs regularly with the Virginia Grand Military Band (Sudler Silver Scroll Recipient, 2000), with whom she has recorded on numerous live concerts, as well as the soundtrack for the Bill Moyers PBS documentary "America's First River; the Hudson." She is principal flute and served as Artistic Planning Committee chair for the Spotswood Community Orchestra and recently joined the flute section of the Piedmont Symphony Orchestra. She is Co-Director for the St. George's Chamber Music Series and has performed numerous times as part of that series. While a member of the Marine Forces Pacific Band in Kaneohe Bay, Hawaii, with whom Tina toured Australia and New Zealand, she served as woodwind section commander and solo flutist.

Information about Tina Christie taken from her website:

http://www.tinakerchner.com/about.shtml

Katherine Saenger

Katherine Saenger is a research staff member and inventor at the IBM T.J. Watson Research Center in Yorktown Heights, NY, where she works in silicon technology. She received an AB in physics from Barnard College (1975) and a PhD in chemical physics from Harvard University (1981). As a young flutist, she studied with John Wummer, Harold Bennett, and Thomas Nyfenger. She has written about flute head joint acoustics [Flutist Quarterly, Fall 1996] and why cold flutes play flat [NYFC Newsletter, April 2001]. She has played flute with Collegium Westchester since 2000 and been editor of the New York Flute Club Newsletter since 1999.

Biography supplied by Katherine Saenger.

Immanuel Davis

Educated at the Juilliard School, Immanuel Davis received both Bachelor's and Master's degrees as a student of Julius Baker. Other studies have been with Keith Underwood, Ransom Wilson, Sandra Miller, and with Philip Dunigan at the North Carolina School of the Arts. In 2001 he was awarded a Fulbright Grant under the auspices of the Netherlands-America Foundation for study of the baroque flute. He has performed as a recitalist and chamber musician at Weill Recital hall at Carnegie Hall, MoMa's Summer Garden Series, Noonday Concerts at Trinity Church, and the Meet the Virtuoso series at the 92nd St Y. As a member of the New York Flute and Harp Project, he has performed with harpist Park Stickney at the Edinburgh Fringe Festival and on board the Queen

Elizabeth 2. Orchestral work has included performances with the St. Paul Chamber Orchestra, Oregon Symphony, Riverside Symphony, Hudson Valley Philharmonic, Jupiter Symphony, and Buffalo Philharmonic. Davis has also played on Broadway in Show Boat and Ragtime, among others, and has performed with the contemporary music ensembles Music Mobile and 20th Century and Beyond. Immanuel released his first CD, "Prevailing Winds" in December of 2003. Immanuel Davis has been the flute professor at the University of Minnesota since 2001.

Information on Immanuel Davis taken from the University of Minnesota website:

https://apps.cla.umn.edu/directory/profiles/davis210

Patricia George

Patricia George has served on the faculties of the Eastman School of Music, Idaho State University and Brigham Young University - Idaho, and currently is the flute professor at the Sewanee Music Festival and the American Band College. She is the editor for *Flute Talk* magazine and writes the monthly column "The Teacher's Studio." Ms. George presents her "Flute Spa" participatory masterclasses throughout the United States for universities and flute clubs. Ms. George is a graduate of the Eastman School of Music with the B.M., M.M., and Performer's Certificate in Flute. She studied with Frances Blaisdell, Joseph Mariano, William Kincaid, and Julius Baker.

Information about Patricia George was taken from her website:

http://www.fabulousflute.com/index.html

Paula Gudmundson

Ms. Gudmundson is completing a Doctorate of Musical Arts at the University of Minnesota as a Berneking Fellow studying with Immanuel Davis. She completed a Master of Music at the University of North Texas and Bachelor of Music at Lawrence University. Her principal teachers include Immanuel Davis, Terri Sundberg, Ernestine Whitman and Adrianne Greenbaum. Gudmundson has taught at MacPhail Center for Music, her home studio, in the Shoreview, White Bear Lake and Saint Paul areas, and joined the Anoka Ramsey Community College faculty in 2011. Gudmundson has presented workshops for Minnesota Music Education Association, Vocal Essence's Witness Program, and masterclasses throughout the area.

Information on Paula Gudmundson taken from her website:

http://www.paulagudmundson.com/site/About_Me.html

Hilary Jones

Hilary Jones is a New York-based professional flutist. Hilary studied flute performance at The Boston Conservatory with flutist Sarah Brady and received her Bachelor of Music from Loyola University New Orleans, where she was a student of Patti Adams. Hilary recently won the Louisiana Flute Society's College Masterclass Competition and the MidSouth Flute Society's College Masterclass Competition, and she was also a finalist for the Loyola Symphony Orchestra's Concerto Competition. Hilary served as principal flute of both the Loyola Symphony Orchestra and the Loyola Wind Ensemble from 2008 through 2011. She has also played alongside musicians from the Louisiana Philharmonic Orchestra (LPO) for several Montage series opera productions in New Orleans.
She is currently pursuing her Master of Music at New York University, where she is a student of renowned flutist Keith Underwood.

Information on Hilary Jones taken from her website:

http://www.hilaryjonesflute.com/

Catherine LeGrand

Catherine LeGrand received her Bachelor of Music and Masters of Music from the University of Cincinnati, College-Conservatory of Music with additional studies at Temple University in Philadelphia. Teachers include Keith Underwood, Paige Brook, Loren Lind, Kyril Magg, Jack Wellbaum and Robert Cavally. Ms. LeGrand has served as Principal Flute of the Houston Grand Opera, Texas Opera Theater Orchestra, Piccolo of the Lexington Philharmonic (KY), and has performed often with the Houston Symphony. She has also performed with the Grand Teton Festival Orchestra, the West Virginia Symphony, and the Houston Ballet Orchestra. She cultivates a private flute studio comprised of beginners though professionals, while maintaining a busy personal appearance schedule as soloist, recording artist, chamber musician, traveling pedagogue and clinician. She serves as Principal Flute and frequent soloist with the Superior Festival Orchestra based in Marquette, Michigan. LeGrand serves as Adjunct Professor of Flute at Campbell University.

Information on Catherine LeGrand taken from her website:

http://www.catherinelegrand.com/

Keith Underwood

As a performer, Underwood has appeared with the New York Philharmonic, New York Chamber Symphony, the Orpheus Ensemble, the Orchestra of St. Luke's. He is solo flutist with the Parnassus and Musical Elements, Jazz Antiqu, the Arcadia Baroque Ensemble, Ufonia and the Riverside Symphony. Underwood has recorded with Benjamin Verdery, Celine Dion, Kathleen Battle, Rod Stewart, Bobby McFerrin, and Anthony Newman. He appears frequently on the David Letterman Show. Underwood's students hold positions with America's major orchestras including the Boston Symphony, the Cleveland Orchestra and the Metropolitan Opera Orchestra. Globally, his students are members of orchestras in Italy, Japan, Canada, Mexico and Brazil. Underwood serves on the faculties of Mannes School of Music, New York University and Queens College. Each year he travels internationally to Japan, Mexico, Italy, Brazil and London to teach workshops and to perform.

Information on Keith Underwood taken from his website:

http://keithflute.com/Keithflute/home.html

APPENDIX B

Survey Questions and Responses

Strategies for Teaching Internal Aspects of Flute Technique   SurveyMonkey

1. The purpose of this survey is to gain information about flutists' experiences of teaching strategies that address internal areas of flute technique. Internal techniques are defined as including tonguing, vibrato, the position and shape of the tongue and throat. Strategies that were mentioned in the literature are listed in this survey accompanied by questions regarding their relative effectiveness. The survey is intended to gather participants' ratings of the strategies listed and not intend to imply preference for any strategy. Part two of this study will feature exceptional or innovative strategies named by participants in this survey. Participation in part two of the study will be voluntary and participants may choose to self-nominate for inclusion. Confidentiality of participants is ensured as no tracking of identifying information will occur. If you decide to withdraw from the survey you may close your window at any time. The survey will take approximately 10-15 minutes. The results will be available in the New York Flute Club Newsletter in mid 2012, will be reported in my dissertation and online at my website: https://sites.google.com/site/carolhohauser/. If you have questions or comments regarding this research you may contact Carol Hohauser at : cmh2101@tc.columbia.edu.

		Response Percent	Response Count
I have read the above and consent to participate in this study		98.1%	155
No thanks		1.9%	3
		answered question	158
		skipped question	1
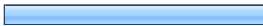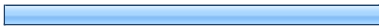
2. Are you over the age of 18?

		Response Percent	Response Count
Yes		**99.4%**	153
No		0.6%	1
	answered question		**154**
	skipped question		**5**

3. Are you a

		Response Percent	Response Count
Professional flutist who majored in flute performance		**90.4%**	132
Student majoring in flute performance		9.6%	14
	answered question		**146**
	skipped question		**13**

4. Have you experience any of the following teaching strategies addressing tonguing, vibrato or throat/tongue/mouth shape? Please check all that apply.

		Response Percent	Response Count
Verbal descriptions of internal physiology		93.3%	125
Visual models of anatomy		55.2%	74
Teacher modeling of the desired sound		**97.8%**	**131**
Use of devices that aid learning		49.3%	66
Creative visualizations/imagery		88.1%	118
Visual representations/ pictures of shapes, colors or places		61.9%	83
Vocal/speech techniques		79.9%	107
Other method not listed		14.9%	20
		answered question	134
		skipped question	25

5. If you chose Other please give a description of the teaching strategy used.

	Response Count
	22
answered question	22
skipped question	137
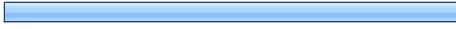
6. Have you experienced the use of anatomical diagrams to assist in the teaching or learning about internal physiology related to vibrato, tonguing or general mouth/throat/tongue shape?

		Response Percent	Response Count
Yes		**59.5%**	**75**
No		40.5%	51
		answered question	126
		skipped question	33

7. Have you experienced the use of drawings that artistically evoke a desired "shape" of sound produced by vibrato, tonguing or tone?

		Response Percent	Response Count
Yes		**61.9%**	**78**
No		38.1%	48
		answered question	126
		skipped question	33

8. Have you experienced the use of verbal descriptions of the internal physiology of the mouth, throat or tongue to improve the production of tonguing, vibrato or tone?

		Response Percent	Response Count
Yes		**96.8%**	**122**
No		3.2%	4
		answered question	126
		skipped question	33

9. Have you experienced creative visualizations or imagery to improve tone, vibrato or tonguing?

		Response Percent	Response Count
Yes		93.7%	118
No		6.3%	8
	answered question		126
	skipped question		33

10. Have you experienced the reference to speech syllables or to vocal/singing technique to improve vibrato, tone or tonguing?

		Response Percent	Response Count
Yes		99.2%	125
No		0.8%	1
	answered question		126
	skipped question		33

11. Have you experienced teacher modeling for the purpose of improving vibrato, tone or tonguing in the student?

		Response Percent	Response Count
Yes		99.2%	125
No		0.8%	1
	answered question		126
	skipped question		33
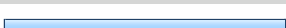
12. Have you experienced other methods such as equipment or devices to improve vibrato, tone or tonguing?

		Response Percent	Response Count
Yes		53.2%	67
No		46.8%	59
	answered question		126
	skipped question		33

13. Please name any other strategies you have experienced that were used to improve tone, tonguing or vibrato

	Response Count
	24
answered question	24
skipped question	135

14. Please check the strategies that you find to be the most useful for teaching internal aspects of flute technique such as vibrato, tonguing and mouth/tongue/throat shape.

	Response Percent	Response Count
Using diagrams of internal physiology	26.5%	31
Pictures evoking the desired sound	20.5%	24
Verbal descriptions of internal physiology	69.2%	81
References to speech syllables or vocal techniques	82.1%	96
Imitating the teacher's example	**83.8%**	**98**
Imagery or creative visualization	59.8%	70
Equipment or devices	24.8%	29
Other strategy	12.0%	14
	answered question	117
	skipped question	42

15. Please list any strategy not listed above

	Response Count
	17
answered question	17
skipped question	142

16. Please rate the effectiveness of the following strategies in addressing internal techniques such as vibrato, mouth/tongue/throat shape and tonguing

	Negative effect	Not effective	No opinion	Somewhat effective	Very effective	Rating Average	Response Count
Using diagrams of internal structures	0.0% (0)	7.7% (9)	29.1% (34)	**50.4% (59)**	12.8% (15)	3.68	117
Pictures evoking the desired sound	0.0% (0)	17.1% (20)	29.9% (35)	**36.8% (43)**	16.2% (19)	3.52	117
Verbal descriptions of internal physiology	0.0% (0)	1.7% (2)	5.9% (7)	**57.6% (68)**	34.7% (41)	4.25	118
References to speech syllables or vocal technique	0.0% (0)	0.8% (1)	5.1% (6)	25.4% (30)	**68.6% (81)**	4.62	118
Imitating the teacher's example	0.0% (0)	0.8% (1)	2.5% (3)	23.7% (28)	**72.9% (86)**	4.69	118
Imagery or creative visualization	0.0% (0)	6.8% (8)	13.6% (16)	30.5% (36)	**49.2% (58)**	4.22	118
Equipment or devices	0.0% (0)	9.7% (11)	**40.7% (46)**	27.4% (31)	22.1% (25)	3.62	113
Other strategy	0.0% (0)	0.0% (0)	**71.2% (47)**	9.1% (6)	19.7% (13)	3.48	66
					answered question		**118**
					skipped question		**41**

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17. Please rate the effectiveness of the following teaching strategies as related to tonguing.

	Negative effect	Not effective	No opinion	Somewhat effective	Very effective	Rating Average	Response Count
Teacher modeling of tonguing	0.0% (0)	2.8% (3)	0.9% (1)	37.7% (40)	**58.5% (62)**	4.52	106
Use of speech syllables for the tongue	0.0% (0)	3.8% (4)	3.8% (4)	22.6% (24)	**69.8% (74)**	4.58	106
Use of speech syllables relating to mouth shape	0.0% (0)	1.9% (2)	10.4% (11)	32.1% (34)	**55.7% (59)**	4.42	106
Use of speech syllables for throat shape	1.0% (1)	6.7% (7)	15.2% (16)	31.4% (33)	**45.7% (48)**	4.14	105
Reference to vocal technique such as resonators	0.0% (0)	7.8% (8)	**34.0% (35)**	**34.0% (35)**	24.3% (25)	3.75	103
Discussion of the shape of the the mouth, throat and tongue	0.0% (0)	4.8% (5)	6.7% (7)	43.8% (46)	**44.8% (47)**	4.29	105
Descriptions of images or feelings	0.9% (1)	17.9% (19)	14.2% (15)	**43.4% (46)**	23.6% (25)	3.71	106
Describing the feeling of the mouth, throat or tongue	0.0% (0)	7.6% (8)	6.7% (7)	**44.8% (47)**	41.0% (43)	4.19	105
Discussing the inside structure of the mouth/throat/tongue	0.0% (0)	6.7% (7)	11.4% (12)	**42.9% (45)**	39.0% (41)	4.14	105
Imitating a desired sound	0.0% (0)	3.8% (4)	1.9% (2)	25.7% (27)	**68.6% (72)**	4.59	105
Depictions on paper of a desired sound shape	1.9% (2)	20.2% (21)	26.0% (27)	**36.5% (38)**	15.4% (16)	3.43	104
Speaking about colors or emotions	1.9% (2)	16.2% (17)	14.3% (15)	**41.9% (44)**	25.7% (27)	3.73	105
Learning vocal technique	0.0% (0)	6.8% (7)	31.1% (32)	**32.0% (33)**	30.1% (31)	3.85	103
Pictures of the inside of the mouth	1.0% (1)	14.3% (15)	**37.1% (39)**	32.4% (34)	15.2% (16)	3.47	105
Using a device for practicing	2.9% (3)	12.4% (13)	**41.9% (44)**	23.8% (25)	19.0% (20)	3.44	105

	Negative effect	Not effective	No opinion	Somewhat effective	Very effective	Rating Average	Response Count
Pictures of the inside of the throat	1.9% (2)	21.2% (22)	**43.3% (45)**	21.2% (22)	12.5% (13)	3.21	104
Pictures of the inside of the nose	2.9% (3)	28.6% (30)	**47.6% (50)**	14.3% (15)	6.7% (7)	2.93	105
						answered question	106
						skipped question	53

18. Please rate the following teaching strategies as related to vibrato.

	Negative effect	Not effective	No opinion	Somewhat effective	Very effective	Rating Average	Response Count
Teacher modeling of vibrato	0.0% (0)	0.9% (1)	0.9% (1)	25.5% (27)	**72.6% (77)**	4.70	106
Use of speech syllables for vibrato	0.0% (0)	11.7% (12)	24.3% (25)	29.1% (30)	**35.0% (36)**	3.87	103
Use of speech syllables relating to mouth shape	0.0% (0)	6.7% (7)	28.6% (30)	25.7% (27)	**39.0% (41)**	3.97	105
Use of speech syllables for throat shape	1.0% (1)	10.5% (11)	28.6% (30)	29.5% (31)	**30.5% (32)**	3.78	105
Reference to vocal technique such as resonators	0.0% (0)	4.8% (5)	34.6% (36)	**36.5% (38)**	24.0% (25)	3.80	104
Discussion of the shape of the the mouth, throat and tongue	0.0% (0)	7.7% (8)	23.1% (24)	**38.5% (40)**	30.8% (32)	3.92	104
Descriptions of images or feelings	1.0% (1)	12.4% (13)	19.0% (20)	**44.8% (47)**	22.9% (24)	3.76	105
Describing the feeling of the mouth, throat or tongue	0.0% (0)	7.6% (8)	16.2% (17)	**41.9% (44)**	34.3% (36)	4.03	105
Discussing the inside structure of the mouth/throat/tongue	1.0% (1)	8.6% (9)	25.7% (27)	**39.0% (41)**	25.7% (27)	3.80	105
Imitating a desired sound	0.0% (0)	1.0% (1)	2.9% (3)	22.9% (24)	**73.3% (77)**	4.69	105
Depictions on paper of a desired sound shape	1.9% (2)	15.5% (16)	21.4% (22)	**35.9% (37)**	25.2% (26)	3.67	103

Speaking about colors or emotions	1.9% (2)	12.5% (13)	14.4% (15)	**42.3% (44)**	28.8% (30)	3.84	104
Learning vocal technique	1.0% (1)	3.8% (4)	27.9% (29)	**37.5% (39)**	29.8% (31)	3.91	104
Pictures of the inside of the mouth	1.9% (2)	19.2% (20)	**41.3% (43)**	27.9% (29)	9.6% (10)	3.24	104
Using a device for practicing	3.8% (4)	13.5% (14)	**49.0% (51)**	16.3% (17)	17.3% (18)	3.30	104
Pictures of the inside of the throat	1.9% (2)	19.2% (20)	**44.2% (46)**	26.9% (28)	7.7% (8)	3.19	104
Pictures of the inside of the nose	1.9% (2)	25.7% (27)	**53.3% (56)**	14.3% (15)	4.8% (5)	2.94	105
					answered question	**106**
					skipped question	**53**

19. Please rate the effectiveness of the following strategies as relating to mouth/throat/tongue shape, as affecting tone quality. This study includes only the internal areas of the mouth.

	Negative effect	Not effective	No opinion	Somewhat effective	Very effective	Rating Average	Response Count
Teacher modeling of throat/mouth/tongue shape	0.0% (0)	6.7% (7)	4.8% (5)	33.3% (35)	**55.2% (58)**	4.37	105
Use of speech syllables for tongue shape	0.0% (0)	4.7% (5)	11.3% (12)	32.1% (34)	**51.9% (55)**	4.31	106
Use of speech syllables for mouth shape	0.0% (0)	1.9% (2)	8.6% (9)	31.4% (33)	**58.1% (61)**	4.46	105
Use of speech syllables for throat shape	0.9% (1)	3.8% (4)	12.3% (13)	32.1% (34)	**50.9% (54)**	4.28	106
Reference to vocal technique such as resonators	1.0% (1)	7.6% (8)	25.7% (27)	**34.3% (36)**	31.4% (33)	3.88	105
Discussion of the shape of the the mouth, throat and tongue	0.0% (0)	3.8% (4)	9.5% (10)	39.0% (41)	**47.6% (50)**	4.30	105
Descriptions of images or feelings	1.9% (2)	9.5% (10)	12.4% (13)	**49.5% (52)**	26.7% (28)	3.90	105
Describing the feeling of the mouth, throat or tongue	0.0% (0)	6.7% (7)	9.5% (10)	**41.9% (44)**	**41.9% (44)**	4.19	105
Discussing the inside structure of the mouth/throat/tongue	0.0% (0)	9.5% (10)	18.1% (19)	**41.9% (44)**	30.5% (32)	3.93	105
Imitating a desired sound	0.0% (0)	0.9% (1)	3.8% (4)	26.4% (28)	**68.9% (73)**	4.63	106
Depictions on paper of a desired sound shape	2.9% (3)	18.1% (19)	**32.4% (34)**	30.5% (32)	16.2% (17)	3.39	105
Speaking about colors or emotions	0.0% (0)	11.4% (12)	13.3% (14)	**42.9% (45)**	32.4% (34)	3.96	105
Pictures of the tongue	2.0% (2)	22.8% (23)	**38.6% (39)**	22.8% (23)	13.9% (14)	3.24	101
Learning vocal technique	0.0% (0)	6.7% (7)	29.5% (31)	**38.1% (40)**	25.7% (27)	3.83	105

Pictures of the inside of the mouth	2.0% (2)	18.6% (19)	**38.2% (39)**	26.5% (27)	14.7% (15)	3.33	102
Using a device for practicing	5.7% (6)	10.5% (11)	**44.8% (47)**	21.0% (22)	18.1% (19)	3.35	105
Pictures of the inside of the throat	3.9% (4)	20.4% (21)	**43.7% (45)**	22.3% (23)	9.7% (10)	3.14	103
Pictures of the inside of the nose	2.9% (3)	26.9% (28)	**48.1% (50)**	15.4% (16)	6.7% (7)	2.96	104
					answered question		**106**
					skipped question		**53**

	Page 5, Q2. If you chose Other please give a description of the teaching strategy used.	
1	Use of software to analyze tonal spectrum	Mar 30, 2012 5:29 PM
2	Teaching HAH for the flutist to learn to separate the vocal folds. Using various vowel sounds to shape the tongue which affects the angle of the air stream Use of pinwheel to measure speed of air Use of tuner to check even air as well as intonation Use of post-its on the embouchure plate to chart movement of air. Use of hand to feel air stream and to discover where it is Use of mirror, video camera, iphone, voice recorder (2 speeds)	Mar 30, 2012 12:54 PM
3	Executing airstream and articulation without flute	Dec 7, 2011 9:58 AM
4	vowel sounds	Dec 5, 2011 11:06 AM
5	Have used Body Mapping and Alexander Technique as well, which are very specific uses of verbal description of internal physiology that also include a philosophy of approach to learning.	Dec 2, 2011 10:00 AM
6	harmonics; lip flexibility exercises; foreign language sounds; metronomic pulsing	Nov 30, 2011 12:33 PM
7	The Force, seriously!!!	Nov 29, 2011 2:26 PM
8	Singing while playing	Nov 29, 2011 1:00 PM
9	loud/soft- concrete suggestions	Nov 29, 2011 11:51 AM
10	different syllabi like loe instead of toe - or yoe instead of goe	Nov 29, 2011 11:34 AM
11	Sorry- no other teaching technique, but I wanted to mention that in addition to flute performance, I also have a degree in music education from the Crane School of Music. I think this is important to mention as I have discussed and researched teaching techniques as part of my schooling, something my colleagues who don't have ed degrees haven't done. I think it's why I'm a very good problem solver for my students. But back to the survey....	Nov 29, 2011 11:00 AM
12	Whistling techniques Demonstrations of Inuit throat singing	Nov 29, 2011 10:46 AM
13	Some physical activities (body awareness/body movement) as well	Nov 29, 2011 10:17 AM
14	Indirect procedures or principles based in Alexander Technique	Nov 29, 2011 9:39 AM
15	Plastic bag on the end of the headjoint. When the student vibrates or tongues, the bag will bounce up and down. Seeing the bag bounce helps students develop control. Sometime I place postit strips on the outer edge of the embouchure hole. They will bounce with the vibrato cycle. Lots of others tricks too.	Apr 14, 2011 7:51 AM
16	Blowing air on our own hands/wrists to understand how lip position affects the direction of air or to understand the difference between warm and cold air.	Apr 10, 2011 4:05 PM
17	tonguing: spit rice (Suzuki tonguing) vibrato: using HAH HAH HAH or EH EH EH to vibrate vocal folds. played "rough" then "smooth" or "slurred" to form the vibrato	Apr 9, 2011 4:37 PM
18	Rice for tonguing, balloons for breathing, etc.	Apr 9, 2011 8:42 AM

Page 5, Q2. If you chose Other please give a description of the teaching strategy used.		
19	Physical modelling--connecting the sound with a moving hand, like watching flute vibrato to pretend-playing vibrato on a violin.	Apr 9, 2011 1:55 AM
20	Telling students to yawn in order to lift the soft palate.	Apr 8, 2011 9:29 PM
21	spectral analysis	Apr 8, 2011 9:28 PM
22	pneumo-pro breathing bag	Apr 8, 2011 1:01 PM

	Page 6, Q8. Please name any other strategies you have experienced that were used to improve tone, tonguing or vibrato	
1	Body Mapping and learning proper use of the body through Alexander Technique have been particularly useful. Just learning to get in balance and not thrusting my jaw forward to make octaves and third registers and not pushing my head forward made a remarkable change in my playing (and that of my students) ease and freedom of tone and ability to make fine adjustments in tone and resonance.	Mar 30, 2012 5:32 PM
2	Teaching HAH for the flutist to learn to separate the vocal folds. Using various vowel sounds to shape the tongue which affects the angle of the air stream Use of pinwheel to measure speed of air Use of tuner to check even air as well as intonation Use of post-its on the embouchure plate to chart movement of air. Use of hand to feel air stream and to discover where it is Use of mirror, video camera, iphone, voice recorder (2 speeds)	Mar 30, 2012 12:54 PM
3	Tone: The development of nasopharyngeal (sp?) muscles to reduce the amount of air leaking through the nose while playing. This was done by submerging one's head in a bucket of water for short periods of time whilst controlling the amount of air that was expelled out of the nose.	Mar 29, 2012 8:46 AM
4	use of breathing bag, tube with ping pong ball	Dec 3, 2011 11:25 AM
5	Exercises assigned	Dec 2, 2011 10:01 AM
6	Coaching of melodies, especially opera melodies; listening to recordings of great performers, especially flutists and singers.	Nov 30, 2011 9:37 PM
7	Physically placing hands on student- rib cage, etc. to encourage resonance of sound, etc.	Nov 30, 2011 4:08 PM
8	listening to recordings; playing along with recordings; playing with a drone	Nov 30, 2011 12:35 PM
9	Spectrum analyzer for tone quality study. Used to correlate subjective terms (light, dark) with actual spectral content.	Nov 29, 2011 6:56 PM
10	Becoming the music	Nov 29, 2011 2:27 PM
11	Sheet music etudes & exercises; Youtube and recording modeling; written descriptions in books (method books as well as other books)	Nov 29, 2011 12:53 PM
12	Listening to other flutists on recording and in concert.	Nov 29, 2011 11:56 AM
13	I have my students imagine that the air moving through the flute is actually water. I can then say the water is only filling up 1/3 of the tube, or it's dribbling out and it needs to guxh out, etc. It seems to work well with younger students and as the air quantity or velocity increases, the tone quality improves.	Nov 29, 2011 11:03 AM
14	Exercises with balance and support through the back to liberate the facial and mouth tensions to open the sound and vibrato. Also use of historical tongueing technique.	Nov 29, 2011 10:49 AM
15	Targeted exercises that break down into working on a single concept	Nov 29, 2011 10:18 AM
16	Tongue assisted embosure (buzzing) Whistle Finger breath Breathing bag	Nov 29, 2011 9:42 AM

	Page 6, Q8. Please name any other strategies you have experienced that were used to improve tone, tonguing or vibrato	
17	Breath, listening, feeling, becoming aware of sensations, immersion in musical style	Jul 14, 2011 4:56 PM
18	recording devices for instant digital feedback, both visual and sound.	Jun 10, 2011 2:19 AM
19	buzzing, finger breaths, body positions (such as monkey, slouching, leaning against a wall, twisting)	Apr 13, 2011 7:12 AM
20	Rather than being shown drawings of shapes, I have been told to think of a certain shape for my tongue or mouth to be in to produce a certain effect.	Apr 10, 2011 4:08 PM
21	Practicing vibrato and tonguing in "chunks"	Apr 9, 2011 4:38 PM
22	listening to other instrumentalists or singers	Apr 9, 2011 4:50 AM
23	Vibrato - use of metronome, and of John Wion's website (with examples of vibrato slowed down 300%).	Apr 8, 2011 9:30 PM
24	coordination of breath, air speed and shape of aperture	Apr 8, 2011 1:02 PM

	Page 7, Q2. Please list any strategy not listed above	
1	It is a combination of the above that works, not one single technique. Also what works for tonguing is different for vibrato, so for me to answer this question, I would answer differently depending on whether it is vibrato or tonguing	Dec 10, 2011 8:15 AM
2	My own physical exploration in practice and also the use of exercises invented by my teachers.	Dec 2, 2011 10:03 AM
3	audio recording	Dec 2, 2011 8:42 AM
4	Physically placing hands on student in important places for support, etc.	Nov 30, 2011 4:10 PM
5	playing with a drone; playing with a tuner; LISTENING	Nov 30, 2011 12:36 PM
6	Anatomy and voice technique books.	Nov 29, 2011 6:59 PM
7	Listening to examples of vibrato and copying them. This website has been really helpful for my students: http://homepage.mac.com/johnwion/vibrato.html	Nov 29, 2011 3:23 PM
8	Listening to artist performers on all instruments/voices	Nov 29, 2011 2:28 PM
9	go to a "new" place in your brain to learn - makes change easier	Nov 29, 2011 11:37 AM
10	Once the student has the concept down, I write little pictures on their music where they need reminders to reinforce during the week. For example, when ascending to a high note, in order to counterballance the tendency to clench, I write a (pretty laughable) picture of open teeth at the beginning and midpoint of the run. This helps reinforce what they know when I can't be there to remind them.	Nov 29, 2011 11:06 AM
11	Larger body involvement in support and direction of air and vibrato development	Nov 29, 2011 10:52 AM
12	Breaking down the concepts into part-whole -part strategies	Nov 29, 2011 10:19 AM
13	listening to the sound of the inhalation to draw conclusions about the internal physiology of the student's mouth/throat.	Nov 29, 2011 9:52 AM
14	listening - obvious, but often overlooked	Jul 14, 2011 4:58 PM
15	buzzing, finger breaths, body positions	Apr 13, 2011 7:15 AM
16	Practicing tonguing and vibrato in chunks, changing shape of inside of mouth to different vowel sounds to change tone quality.	Apr 9, 2011 4:40 PM
17	spectral analysis	Apr 8, 2011 9:30 PM

APPENDIX C

Standard Deviation and Mean from Responses to Survey Questions 16-19

Table 1

Question 16: *Please rate the effectiveness of the following strategies in addressing internal techniques such as vibrato, mouth/tongue/throat shape and tonguing*

Statement	Mean	Standard Deviation
Using diagrams of internal structures	3.68	3.26
Pictures evoking the desired sound	3.52	3.14
Verbal Descriptions of Internal Physiology	4.25	3.79
References to speech syllables or vocal technique	4.62	4.15
Imitating the teacher's example	4.69	4.21
Imagery or creative visualization	4.22	3.82
Equipment or devices	3.62	3.23
Other strategy	3.48	3.07

Table 2

Question 17: *Please rate the effectiveness of the following strategies as related to tonguing*

Statement	Mean	Standard Deviation
Teacher Modeling of Tonguing	4.52	4.06
Use of speech syllables for the tongue	4.58	4.14
Use of speech syllables relating to mouth shape	4.42	3.97
Use of speech syllables for throat shape	4.14	3.75
Reference to vocal techniques such as resonators	3.75	3.35
Discussion of the shape of the mouth, throat and tongue	4.29	3.85
Descriptions of images or feelings	3.71	3.35
Describing the feeling of the mouth, throat or tongue	4.19	3.77
Discussing the inside structure of the mouth/throat/tongue	4.14	3.73
Imitating a desired sound	4.59	4.14
Depictions on paper of a desired sound shape	3.43	3.08
Speaking about colors or emotions	3.73	3.35
Learning vocal technique	3.85	3.46
Pictures of the inside of the mouth	3.47	3.09

Using a device for practice	3.44	3.08
Pictures of the inside of the throat	3.21	2.85
Pictures of the inside of the nose	2.93	2.56

Table 3

Question 18: *Please rate the following teaching strategies as related to vibrato*

Statement	Mean	Standard Deviation
Teacher modeling of vibrato	4.70	4.22
Use of speech syllables for vibrato	3.87	3.51
Use of speech syllables relating to mouth shape	3.97	3.59
Use of speech syllables for throat shape	3.78	3.42
Reference to vocal technique such as resonators	3.80	3.39
Discussion of the shape of the mouth, throat and tongue	3.92	3.52
Descriptions of images or feelings	3.76	3.38
Describing the feeling of the mouth, throat or tongue	4.03	3.62
Discussing the inside structure of the mouth/throat/tongue	3.80	3.41
Imitating a desired sound	4.69	4.21
Depictions on paper of a desired sound shape	3.67	3.32
Speaking about colors or emotions	3.84	3.47
Learning vocal technique	3.91	3.51
Pictures of the inside of the mouth	3.24	2.86
Using a device for practicing	3.30	2.95

Pictures of the inside of the throat	3.19	2.80
Pictures of the inside of the nose	2.94	2.53

Table 4

Question 19: Please rate the effectiveness of the following strategies as relating to mouth/throat/tongue shape, as affecting tone quality. This study includes on the internal areas of the mouth.

Statement	Mean	Standard Deviation
Teacher modeling of throat/mouth/tongue shape	4.37	3.95
Use of speech syllables for tongue shape	4.31	3.95
Use of speech syllables for mouth shape	4.46	4.01
Use of speech syllables for throat shape	4.28	3.87
Reference to vocal technique such as resonators	3.88	3.49
Discussion of the shape of the mouth, throat and tongue	4.30	3.87
Descriptions of images or feelings	3.90	3.51
Describing the feeling of the mouth, throat or tongue	4.19	3.77
Discussing the inside structure of the mouth/throat/tongue	3.93	3.54
Imitating a desired sound	4.63	4.16
Depictions on paper of a desired sound shape	3.39	3.05
Speaking about colors or emotions	3.96	3.57
Pictures of the tongue	3.24	2.89

Learning vocal technique	3.83	3.42
Pictures of the inside of the mouth	3.33	2.98
Using a device for practicing	3.35	3.02
Pictures of the inside of the throat	3.14	2.78
Pictures of the inside of the nose	2.96	2.58