LONG, MICHAEL KENNETH, D.M.A. The Effectiveness of the *SmartMusic*®
Assessment Tool for Evaluating Trombone Student Performance. (2011)
Directed by Dr. Randy Kohlenberg. 52 pp.

The purpose of this study was to discuss the *SmartMusic*® assessment feature and

to determine the effectiveness of this software with regard to student trombonists. The

study was completed due to the widespread use of this convenient method for

evaluating trombone student performances.

The document includes an overview of evaluation that addresses subjectivity

and objectivity, as well as the need for evaluation in music education. A discussion of

evaluation was applied specifically to trombone students along with an examination of

the essential criteria that were to be addressed during a performance evaluation. Visual

criteria in the study included the advantages and disadvantages to having a blind

evaluation. Aural criteria included subjective and objective elements in five categories of

brass performance evaluation including articulation, rhythm, tone, intonation, and

musicianship/style as presented in Wardlaw's (1997) *Performance Rating Scale*.

Background information about the software *SmartMusic*® and its grading feature

was presented. The study also included a discussion of seventeen recorded performances

using *SmartMusic*®. To test the evaluation feature of the software, an etude was

performed seventeen times on the trombone. In each performance, one element was

changed that focused upon one component of the evaluation. The purpose of this part of

the study was to see how each change affected the assessment feature's assigned grade for

each performance.

The *SmartMusic®* assessment feature assigned a dichotomy of high and low grades, classifiable as A and F respectively. This grading tendency was a result of the parameters used by the assessment feature to determine which notes are deemed correct or incorrect. The *SmartMusic®* assessment feature only employs limited objective criteria to evaluate; subjective criteria and all other objective criteria are not evaluated. As a result, many common problems for trombone students automatically result in a failing grade, whereas a human evaluator may only reduce a student's grade marginally for such problems. Furthermore, other common problems for trombone students are not addressed by *SmartMusic®*. A human evaluator, however, can address these problems, grade the student appropriately, and provide feedback for future performances.

THE EFFECTIVENESS OF THE *SMARTMUSIC*® ASSESSMENT

TOOL FOR EVALUATING TROMBONE

STUDENT PERFORMANCE

by

Michael Kenneth Long

A Dissertation Document Submitted to
the Faculty of The Graduate School at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements for the Degree
Doctor of Musical Arts

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Approved by

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Committee Chair

APPROVAL PAGE

This dissertation has been approved by the following committee of the Faculty of

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PREFACE

This document is a component of the dissertation requirement at the University of North Carolina at Greensboro for the Doctor of Musical Arts degree in trombone performance along with three recital performances. The contents of this document, therefore, are intended to be the preliminary results of a more expansive planned study.

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CHAPTER I

INTRODUCTION

Direct instruction and evaluation facilitate student achievement. Direct instruction

provides students with valuable knowledge and information, whereas evaluation

determines the extent to which each student has mastered the material. The quality of

education is closely related to the quality of evaluation regardless of the level of

schooling.[1] Therefore, a successful educational system at any grade level is dependent

upon a successful system of evaluation. For these reasons, understanding the meaning of

the term evaluation, the role of evaluation in education, and characteristics that are the

components of a successful and effective system of evaluation is essential.

An initial clarification of the term predicates any discussion of evaluation in

education. Although tests and measurements can be used to measure student

achievement, the term evaluation is more comprehensive than either of these terms.[2] The

term evaluation encompasses both subjective and objective elements. Subjectivity in

evaluation is most evident when the term is defined as "a summing-up process in which

value judgments play a large part."[3] Although value judgments are integral in the process

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[1] J. David Boyle and Rudolf E. Radocy, *Measurement and Evaluation of Musical Experiences* (New York: Schirmer Books, 1987), 8.

[2] Ibid., 7.

[3] Kenneth D. Hopkins, *Educational and Psychological Measurement and Evaluation* (Needham Heights, MA: Allyn & Bacon, 1998), 6.

of evaluation, the inclusion of objective measures augments the comprehensiveness of the evaluation process.

Evaluation serves a vital role in education. Instructors frequently employ discretion or judgment when evaluating students. Teachers often evaluate subjective content open to interpretation such as narrative essays or works of art. In the arts, qualitative aesthetic elements are inherent and not well suited for objective measurement. Hopkins noted that the subjective methods of evaluation are useful to grade students and to promote their achievements.[4] Much of the evaluation process in education of the arts, however, also includes objective measures.[5]

Traditionally, evaluation in music programs is primarily subjective, due partially to the aesthetic nature of music. In music evaluation, an attempt to adjudicate the value or quality of "individual or group performances" is common.[6] Terms such as value and quality clearly relate to the subjectivity aspect of evaluation. These terms, however, are qualitative when evaluating music, because the meaning varies from teacher to teacher or from adjudicator to adjudicator. In many cases of musical evaluation, the evaluation process is based solely upon subjective criteria. Boyle and Radocy (1987) noted that "much excellent instruction and efficient learning occurs with instructional decisions based solely on subjective, yet enlightened and thoughtful, judgments of teachers,

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[4] Hopkins, 6.

[5] Boyle and Radocy, 8.

[6] Ibid., 7.

curriculum specialists, and administrators."[7] These subjective judgments are common in music education when attempting to determine the effectiveness of tone quality, musical expressivity, phrasing, and style. Furthermore, bias and individual preferences are primary reasons as to why subjective judgments of expressive parameters vary so widely from one individual to another.[8]

Frequently in music, the evaluation process is based on primarily objective criteria. Hopkins (1998) stated, "if a rating remains constant irrespective of the rater, the rating is said to be *objective*."[9] The criteria in the evaluation of a musical performance typically include accuracy in pitch and rhythm. These concrete criteria do not vary and are not based on the opinions or judgments of the listener or adjudicator. In fact, a substantial amount of the evaluation process in music education involves testing, measuring, and gathering quantifiable data that relates to student ability, achievement, or aptitude.[10] Accurate evaluations of objective parameters "may require prior knowledge of music material to develop a basis for consistent judgments."[11] Therefore, a lack of familiarity with the music likely produces less consistent or unreliable evaluations among adjudicators.

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[7] Ibid., 7.

[8] Daryl W. Kinney, "Internal Consistency of Performance Evaluations as a Function of Music Expertise and Excerpt Familiarity," *Journal of Research in Music Education* 56, no. 4 (January 2009): 333.

[9] Hopkins, 7.

[10] Boyle and Radocy, 8.

[11] Kinney, 333.

In music, successful evaluation must be functional.[12] According to Boyle and Radocy (1987), "too often it [evaluation] is done ritualistically, merely because teachers are expected or required to provide grades or some other type of feedback regarding their students' educational progress."[13] Rather than ritualistically assigning and grading tasks, the process of evaluation is most effective when teachers approach the evaluation process as a means to promote achievement and address and subsequently remedy deficiencies in student learning or achievement. Boyle and Radocy (1987) supported this viewpoint by stating, "only to the extent that evaluation efforts provide information that may help improve the quality of an educational enterprise are they serving true evaluation functions."[14]

Subjectivity occurs in music evaluation as in qualitative judgments made by music instructors. Objectivity also occurs in music evaluation as in measurements of concrete elements such as pitch and accuracy with regard to notes and rhythms. Effective evaluation in music also has to be functional. In addition, evaluation not only must be accurate, but also comprehensive and relevant to instructional material presented.[15] Evaluation includes all of the stated attributes to be deemed highly effective. No method of evaluation, however, is without flaws and inaccuracy, although a variety of methods have proven to be more effective than others.

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[12] Ibid., 7.

[13] Ibid., 7.

[14] Ibid., 7.

[15] Ibid., 7.

Since its inception, the assessment feature of the *SmartMusic®* software is one approach to evaluation that is common in instrumental music classes. The purpose of this study has been to examine the effectiveness of the *SmartMusic®* assessment feature as it pertains to trombone performance evaluation. Furthermore, the study examines and describes the characteristics of the *SmartMusic®* assessment feature that provide reliable and helpful evaluative performance data. The study also delineates those aspects that are not measured, and which may in fact, provide results that are misleading. The relative usefulness and effectiveness of the *SmartMusic®* assessment feature as a widely utilized evaluation tool has not been adequately documented beyond the positive uses promoted through the advertisement of the product.

This project addresses specific issues that pertain to the evaluation of trombone performance. Although many of these issues are pertinent to other wind instruments as well, this study focuses upon those issues that affect and are unique to the trombone. Chapter II presents specific issues in trombone performance and includes a discussion of the procedures, methods, and tools that effectively address these issues. Chapter III includes extensive background information about *SmartMusic®* as well as its grading feature. Chapter IV of this project ties the information from the previous chapters together by discussing the *SmartMusic®* assessment feature's evaluation criteria for trombone performance. The information provided in this section suggests possible strengths, weaknesses, and limitations of using this grading feature for trombone students. Chapter V concludes the project with a summary of the project, conclusions reached, and suggestions for research based upon the information provided in this study.

CHAPTER II

EVALUATING TROMBONE PERFORMANCE

As stated in Chapter I, evaluation is essential in improving music performance. Musicians at every level, beginners to the experienced professional musicians, can benefit from an effective and accurate evaluation of music performances. In music teaching, especially in middle and secondary education, traditional evaluation has focused on "student achievement relative to educational objectives."[16] Evaluation therefore becomes an effective way to recognize successes and delineate deficiencies in student learning relative to the objectives of the curriculum.

The need for specific instrumentation in ensembles requires a successful and effective method of evaluation for the performers of those instruments. Wind instruments continue to be an essential component of band education throughout the United States during the twentieth century and into the twenty-first century. Theberge (1997) stated that wind band instruments have "occupied a significant position in secondary school music education programs for many years."[17] A small number of musical instruments during the past century, however, were popular for a short period of time only to become practically obsolete. As an example, the accordion and the player piano became widely popular

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[16] Boyle and Radocy, 7-8.

[17] Ibid., 32.

"only to disappear into obscurity a decade later."[18] The need for an effective evaluation method of these instruments is not of utmost importance, because these instruments have declined in use or have become practically obsolete. Unlike player pianos and accordions, band instruments likely will remain popular through subsequent decades. Therefore, wind band instruments are appropriate candidates for a study in evaluation because they are a lasting and essential component of music education curricula. More specifically, the trombone was selected to evaluate the *SmartMusic®* assessment feature partially because it is integral in the performance of wind band music.

In many ways the trombone is unique, although it shares many performance elements with other wind instruments. The trombone is unique partially because it is an instrument that remained relatively unchanged in its configuration since the fifteenth century. Although throughout its history and changes along with improvements to the mechanism, the trombone looks and is performed essentially in the same manner as it did five hundred years ago. In fact, the student of the twentieth century experiences the same performance challenges as have trombone players from the past. In the United States the use of the slide trombone during the twentieth century became a standard component in the wind band, the jazz ensemble, and the orchestra as these systems of instrumentation became standardized. In virtually every school music program in the United Sates the trombone is integral in the wind band. Obviously, the trombone is also an integral instrument in those ensembles typically supported in secondary schools: jazz, marching, and pep bands, youth orchestras, and others including small ensembles. Because the

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[18] Paul Theberge, *Any Sound You Can Imagine* (Middletown, CT: Wesleyan University Press, 1997), 33.

trombone is versatile and essential in middle school, high school, and collegiate music programs, effective evaluation of trombone student performance is of utmost importance in successful music instruction.

Despite the need to evaluate trombone student performance, no perfect evaluation method exists. The lack of an ideal method for trombone performance evaluation is the same as for other forms of music creation: the interpretation of the selected criteria varies widely among the evaluators. One specific criterion that can affect evaluation is whether or not the adjudicator can view the performer. Both advantages and disadvantages exist with regard to being able to see the performer during the evaluation process, and likewise, advantages and disadvantages are present in a non-visual or blind evaluation.

The term blind audition is commonly used to refer to an audition in which the evaluators or adjudicators are unable to see the performer or gather any information about the performer other than what is heard in the performance. In many professional orchestral auditions, "a screen is used to hide the identity of the player from the committee."[19] In some cases, orchestras "roll out a carpet leading to center stage to muffle footsteps that could betray the sex of the candidate."[20] The carpet serves to specifically prevent any sort of gender discrimination, whereas the screen serves to prevent any sort of discrimination based on the appearance of the performer. Another common situation in a blind audition or evaluation is for each performer to be assigned a

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[19] Claudia Goldin and Cecilia Rouse, "Orchestrating Impartiality: The Impact of 'Blind' Auditions on Female Musicians," *American Economic Review* 90, no. 4 (September 2000): 721.

[20] Ibid., 721.

number in order to retain the confidentiality of all performers, meaning that all reference to a candidate is by number as opposed to name.[21] Protecting the confidentiality of the performers prevents the various types of discrimination that may occur in some auditions or performances that are not blind. These types of discrimination may include gender discrimination, racial or ethnic discrimination, or any other sort of preconceived bias about the appearance of the performer.[22]

Furthermore, "favorites could still be identified by sight"[23] in any sort of audition or playing test that is not blind. Favoritism of this type is possible in orchestras where a member of the selection committee may be more or less inclined to hire a performer that he or she happens to know. A similar situation may occur in an educational setting, where a teacher may tend to grade a student higher for a poor performance if that student is typically a good student, a well-disciplined student, or a highly skilled player of that particular instrument. Blind auditions prevent this sort of favoritism, and they prevent various types of discrimination as well.

In auditions, performances, and playing tests that are not blind, the evaluator can influence the performer's score based on subjective judgments that relate to visual elements of the performance. These visual elements include the aforementioned types of favoritism and discrimination, but they also include factors that may affect the integrity or quality of the performance itself. These factors include: the posture and self-poise of

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[21] Ibid., 721-722.

[22] Ibid., 716.

[23] Ibid., 716.

the performer, the holding position of the instrument, the movement of the performer and instrument throughout the performance, and any other visual factors that could either enhance or detract from the quality of the performance.

Visual elements of musical performance are considered essential for trombone evaluation, and perhaps more so than for most other wind instruments. More so than valves or keys, the visibility of the trombone slide can affect the perspective of an evaluator. Trombones are somewhat large and cumbersome when compared to other instruments; visual variances are easily noted by an evaluator. Extraneous motions or unusual holding positions and posture during a performance can distract from the sound the trombonist produces and thus affect the evaluation. Of course this type of distraction is not problematic in a non-visual evaluation. In an educational setting, however, a teacher may choose to address these issues so that the trombone student is aware that such visual distractions can be problematic and detract from the performance. A blind evaluation does not provide the trombone student with the feedback that can help to improve those performance skills that are dependent upon elements that are visible.

Because middle school and high school band students are in the developmental learning process, teachers or evaluators frequently are required to address visual issues that could impair the students' ability to play their instruments effectively. These issues are often pedagogical with regard to trombone students. As an obvious example, younger trombone students may tend to puff their cheeks while playing, whereas others might try to produce a tone with a very stretched or contorted embouchure. In fact, both of these issues can cause the trombonist to play with a very distorted or unfocused sound,

contribute to fatigue, and ultimately negate positive characteristics of a performance. As another fairly obvious, example: trombone students frequently encounter sound production issues caused by ineffective breathing habits. A student may tend to breathe attempting to use the intercostals rather than using the abdominal muscles to initiate the inhalation. Such problems can result in fatigue or a lack of resonance. Likewise, a student may not breathe in a tempo appropriate to the passage that will in turn disrupt the rhythmic integrity of the music. These elements as well as others are addressable through visual observation.

Issues related to breathing and other pedagogical problems impede student progress, preventing student trombonists from performing as well as they are capable of sounding. In a blind evaluation, these problems are more difficult to identify, because evaluators may be able to hear playing problems without being able to see what could be causing them. In an evaluation that is not blind, evaluators can provide students with additional criticism and advice that can reduce or eliminate certain pedagogical playing problems, thus helping the students to develop their instrumental skills.

A blind evaluation is appropriate if the confidentiality of the performer's identity outweighs the benefits associated with the ability to visually observe the performer's actions while engaged in performing. When trombone students are the performers, a blind audition may or may not be more appropriate than an audition in which the performers are visible to the evaluators. Advantages and disadvantages exist with regard to having a blind evaluation and to having an evaluation where the evaluator can see the performer.

Although visual aspects of a performance can contribute to the evaluation of a particular performance, the evaluation of the sound produced is clearly more important in music. An issue to consider when evaluating trombone students is determining the musical criteria to be evaluated. Wardlaw (1997) devised a performance rating scale for evaluating trombone performance. Divided into five sections, the scale addresses articulation, rhythm, tone, intonation, and musicianship/style.[24] Furthermore, each section is divided into five specific criteria for a total of twenty-five evaluation criteria.[25] As is the case with many effective methods of evaluation, essential subjective and objective components are integral in this rating scale.

Articulation is a criterion for trombone student performance evaluation that contains both subjective and objective sub-criteria. Wardlaw included the phrase "clear and precise" twice in the articulation section of this rating scale.[26] This phrase possesses a subjective nature, because its meaning can vary substantially amongst evaluators. One of Wardlaw's sub-criteria in the articulation section states, "The difference between "spaced" and legato articulations is evident."[27] This phrase is rather objective, because the clear difference between staccato and legato playing requires very little judgment or interpretation on behalf of the evaluator.

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[24] Jeffrey Allen Wardlaw, "The Effects of Guided Practice Instruction on the Weekly Performance Achievement of University Brass Students" (doctoral diss., University of North Carolina at Greensboro, 1997), 148.

[25] Ibid., 148.

[26] Ibid., 148.

[27] Ibid., 148.

In trombone student performances, articulation is based upon a continuous spectrum. Although a distinct difference between pure staccato and pure legato execution exists, appropriate articulation in music typically requires note lengths to be a compromise of both extremes. Subjectivity is required to effectively assess note lengths, because human discretion determines whether or not notes of a specific articulation marking are given proper length. Tonguing is another necessary component of articulation, and the continuous spectrum concept also applies to tonguing. Although types of accents and emphasis markings are notated in trombone compositions, human discretion is required to determine whether the heaviness or lightness of tonguing is appropriate for the music. Therefore, subjectivity in articulation occurs in evaluating both note length and tonguing style.

Another criterion for trombone student performance evaluation is rhythm, which is significantly more objective than subjective. Wardlaw notated indicators throughout this section including: precise rhythmic patterns, beat subdivision, and "control of the tempo."[28] These phrases are highly objective because rhythm execution is necessarily precise and a concept that leaves little for interpretation.

Tone is a criterion for evaluating trombone student performance that is not only subjective, but also somewhat objective. Objectivity occurs when determining whether or not a trombone student's tone is "consistent". Wardlaw used the term "consistent" with regard to tone twice in this section.[29] Evaluators can notice a change in tone quality

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[28] Ibid., 148.

[29] Ibid., 148.

during a performance without requiring any sort of interpretation or value judgment making this aspect of the task more objective.

Tone quality, however, is primarily a subjective criterion in trombone performance evaluation. Although tone can be measured by examining distributions of overtone frequencies, no ideal distribution of overtone frequencies is essentially 'better' than all others. This concept can be exemplified by comparing the tone quality of two renowned trombonists of the twentieth and twenty-first centuries, Joseph Alessi and Christian Lindberg. Both of these artists perform with tone qualities that are clear, precise, and resonant. Alessi's tone is substantially different from that of Lindberg, but neither tone quality, however, is necessarily better than the other. Although tone production issues such as lack of clarity and lack of resonance at the student level may be prevalent, the evaluation of tone quality still requires interpretation and value judgments on behalf of the evaluator. For these reasons, tone quality requires more subjective evaluation than objective evaluation.

Another criterion for evaluating trombone student performance is intonation, which includes both subjective and objective elements. When an instrument is tuned in equal temperament, the evaluator can use a chromatic tuner to measure objectively the number of cents sharp or flat that the performer is playing from the designated pitch. Equal temperament seldom applies to trombone intonation though, unless the trombone player is playing the chromatic scale. In equal temperament, "the major third is somewhat sharp."[30] This sharpness is inevitable on keyboard instruments when the tones are

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[30] *Funk & Wagnalls New World Encyclopedia*, s.v. "Tuning Systems, Musical."

sounded simultaneously. When a trombone performs with other instruments, most likely mean tone tuning is in effect and most appropriate to human hearing. Mean tone tuning requires the third of the major chord to be lowered slightly so that this tone does not sound sharp in context. When the trombonist has the third of the major chord, the slide can be extended to compensate for this sharpness. This adjustment is a relatively simple task for a trombonist and probably more so than for many other wind instruments. If an evaluator depends on a chromatic tuner to determine objectively the intonation of the major third in context of a major triad, the tuner will indicate that the note is considerably flat even if the note sounds correct and in tune to the listener.

Pythagorean tuning is a tuning system that "works best for unharmonized melodies, sung or played on a violin or other instrument of adjustable pitch."[31] Tuning considerations are based upon the intervals of the melodic line instead of harmony. Herlinger (1981) stated, "The Pythagorean tuning system is based on acoustically pure octaves and fifths, from which all other intervals derive."[32] This tuning system is useful for unaccompanied melodic trombone playing.

The semitone is narrow in Pythagorean tuning, which results in significantly raised leading tones compared to equal temperament.[33] The narrow semitone also causes the fourth degree of the major scale to become considerably lower than in equal

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[31] Ibid.

[32] Jan Herlinger, "Fractional Divisions of the Whole Tone," *The Journal of the Society for Music Theory* 3 (Spring 1981): 74, http://www.jstor.org/stable/746135 [accessed February 14, 2011].

[33] Ibid., 78.

temperament. These adjustments, when made correctly, are typically in tune to human hearing within a melodic line. If an evaluator depends upon a chromatic tuner to determine objectively the intonation of these notes, the tuner indicates that the performer is out of tune even if these notes sound correct within the context of the melody.

Wardlaw's final criterion for evaluating trombone performance is musicianship/style.[34] This criterion is primarily subjective. One of Wardlaw's sub-criteria states "Dynamic contrast is evident."[35] This sub-criterion is objectively based, because interpretation and value judgments are not necessary to determine whether or not a trombone student has adjusted his or her playing volume. Subjectivity is involved, however, in determining to what extent the dynamic contrast is appropriate for the music selection. Wardlaw's other sub-criteria that are distinctly subjective include: appropriate interpretation, phrasing, and having an effective overall performance.[36]

Evaluation of trombone student performance is necessary in music education, but a consensus about the most effective evaluation has not been achieved. An evaluator may prefer to observe visually the student that is performing, whereas another evaluator may prefer not to view the student. Advantages and disadvantages exist with regard to both of these approaches to evaluation. When the student is visible, the evaluator might favor or discriminate against that particular student. The evaluator can include visual criteria in the evaluation process, however. Visual criteria may include: posture, horn angle,

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[34] Wardlaw, 148.

[35] Ibid., 148.

[36] Ibid., 148.

extraneous body movement, grip of the instrument, and hand position of the slide. An

effective evaluation that includes this criteria is likely to provide the student with useful

feedback that may help his or her future performances. A blind evaluation is

advantageous when it prevents the possibility of discrimination and favoritism, but a

blind evaluation is disadvantageous when it prevents the student from obtaining helpful

feedback regarding the visual elements of his or her performance.

Because sound is the primary concern in music, aural elements are crucial in the

evaluation of student trombonists. Wardlaw (1997) divided these aural elements into five

categories: articulation, rhythm, tone, intonation, and musicianship/style.[37] Each of these

criteria contains five sub-criteria, some of which are objectively based and some of which

are subjectively based.[38]

An effective assessment of trombone student performance requires the evaluator

to address the evaluation criteria discussed in this chapter. A human evaluator is capable

of evaluating subjective and objective criteria, whereas a computer program measures

objective criteria based on programmed parameters. By identifying which criteria are

objective and which are subjective, the practical uses and limitations of the computer

software program become apparent. Chapter 3 includes a discussion of *SmartMusic®*,

and this chapter explores the possibilities of utilizing the *SmartMusic®* assessment

feature as an evaluative tool for instrumental music with special emphasis upon how it

can be utilized to evaluate the trombone.

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[37] Ibid., 148.

[38] Ibid., 148.

CHAPTER III

SMARTMUSIC® AND ITS ASSESSMENT FEATURE

SmartMusic® is a versatile computer program designed to develop the

performance skills and pursue the potential and talent of music students. Originally

released in 1994 as *Vivace*®, this program was a hardware-based accompaniment tool

with built-in intelligence.[39] *Vivace*® was expensive when it was released in 1994,

although this original version of the program was eventually replaced by a less expensive

software-only version of the program renamed *SmartMusic*®.[40]

SmartMusic® contains several features that are convenient for music students.

The software includes: fingering charts for woodwind and brass instruments, a dictionary

of music terms, and instructional videos.[41] In order to have full access to the many

features that *SmartMusic*® contains, the user must purchase an annual subscription. This

subscription plan provides the user with "access to more than 30,000 accompaniments

from a wide variety of publishers and genres."[42] In addition, the *SmartMusic*® software

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[39] Music Education Technology, "The Wide World of SmartMusic," *Music Education Technology* 4, no. 1 (February/March 2006): 10.

[40] Ibid., 10.

[41] Ibid., 12.

[42] Ibid., 12.

includes over 50,000 exercises and the capability to record compact discs.[43] The

subscribed user also has access to "music from many band and string method books, such

as *Standard of Excellence*, *Essential Elements*, and *Accent on Achievement*."[44]

The accompaniment feature in *SmartMusic®* is practical and popular amongst

teachers and students. *SmartMusic®'s "*Intelligent Accompaniment" feature follows the

performer's impromptu tempo changes through a microphone that can detect the beat and

its subdivisions.[45] This Intelligent Accompaniment "has a sliding scale from 1 to 10 and

the default setting is about 3."[46] This sliding scale has limitations though, because the

higher intelligence levels are often hypersensitive to the performer's actions. Former

trumpeter of the Los Angeles Philharmonic Rob Roy McGregor (2007) stated, "If you set

it [Intelligent Accompanist] too high (8 or 9), it can become too erratic to use."[47]

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[43] American String Teacher, "SmartMusic Garners Accolades for Special Innovation at Music Industry Association Awards in London," *American String Teacher* 57, no. 1 (February 2007): 84.

[44] Music Education Technology, 12.

[45] Ibid., 10.

[46] Rob Roy McGregor, "Value and Challenge in Creating SmartMusic Files," *ITG Journal* 31, no. 4 (June 2007): 70.

[47] Ibid., 70.

Figure 1. *SmartMusic® "*Intelligent Accompaniment." www.makingmusicmag.com.

SmartMusic® and the music notation software *Finale®* are both products of the

company MakeMusic®, Inc. The products are highly compatible with one other.[48]

*Finale® "*has a feature that allows you to save a file as a *SmartMusic* accompaniment."[49]

With this feature, the user can "set tempos, fermatas, rehearsal markers, and many other

SmartMusic features directly into the file in Finale."[50] *SmartMusic®* also includes a

feature that can generate up to 50,000 exercises, varying from simple to complex, and

"some instructors make assignments using that feature."[51] These student assignments are

part of *SmartMusic®*'s grade book feature known as *Impact*™.

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[48] Michael Anderson, "Making the Most of SmartMusic and TuneUp," *ITG Journal* 31, no. 1 (October 2006): 71.

[49] Ibid., 71.

[50] Ibid., 71.

[51] Music Education Technology, 14.

SmartMusic® Impact™ is "a web-based student grading and records management system."[52] This feature of *SmartMusic®* is convenient for both students and teachers. With the assessment feature that is utilized by *Impact*™, students play along with the accompaniment and receive immediate feedback on each performance.[53] This immediate feedback is convenient for the student, because a teacher cannot always be available to hear and evaluate every situation or class. This recording feature also is very convenient for students to use. With *Impact*™, students "can record their performances and assessments and e-mail or burn assignments onto a CD."[54] Sam Fritz, director of bands at Center Grove Middle School Central in Greenwood, Indiana, commented upon the *Impact*™ recording feature: "Students are amazed when they hear what they really sound like from the perspective of an audience."[55] This recording feature is a convenient way for students to listen for strengths and weaknesses in their own performance with or without the accompaniment. Learning to play a musical instrument is "a process in which one learns both how to make and *listen* to music."[56] *SmartMusic® Impact*™'s recording feature can assist students with both of these tasks.

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[52] Canadian Musician, "MakeMusic SmartMusic 10.0 & SmartMusic Impact," *Canadian Musician* 29, no. 4 (July/August 2007): 65.

[53] American String Teacher, 84.

[54] Ibid., 84.

[55] Music Education Technology, 14.

[56] Theberge, 4.

Figure 2. Recording Microphone Designed for *SmartMusic®*. www.bhphotovideo.com.

In addition to being convenient for students, *SmartMusic® Impact*™ is also convenient for teachers. Criswell (2007) stated, "Impact allows teachers to assign, evaluate, and keep a record of playing assignments."[57] This feature is convenient for music teachers, because "Impact saves music educators time by computerizing the posting, grading, submitting, and managing of student assignments and their automatically assessed grades."[58] When making assignments using *Impact*™, the teacher reserves the right to set specifications for the student performances. Although students can change the tempo and other variables while practicing, the recorded performance must match the teacher's specifications when it is submitted.[59] In addition to assessing student performance, "Impact allows teachers to keep track of what their students are

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[57] Chad Criswell, "Student Assessment for the Digital Age," *Teaching Music* 15, no. 3 (December 2007): 46.

[58] Canadian Musician, 65.

[59] Criswell, 46.

working on, determine how long they are practicing, and maintain digital records of their performances."[60]

    SmartMusic® has gained popularity since its inception. Once *Vivace®* became software-based and renamed *SmartMusic®*, this program became much more cost efficient. "By 2002, *SmartMusic®* had become a significant tool for a rapidly growing group of teachers and students."[61] On October 3rd, 2006, *SmartMusic®* won the "2006 Special Innovation" award at the annual United Kingdom Music Industry Association Awards."[62] These awards honor innovative and top-selling products within the musical instrument industry. [63] Some collegiate music programs have embraced *SmartMusic®* technology as well. Tom Rudolph, an advocate for technology in music education, led a two-day training session in 2007 for Shenandoah Conservatory faculty, teaching these faculty members how to use *SmartMusic®*.[64] At Shenandoah Conservatory, Winchester, VA, many studio instrumental instructors have integrated the *SmartMusic®* software into their private instruction.[65]

    The *SmartMusic®* software includes a plethora of features that are useful and convenient for both students and teachers. As stated earlier, one of these features,

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[60]   Ibid., 46.

[61]   Music Education Technology, 10.

[62]   American String Teacher, 84.

[63]   Ibid., 84.

[64]   Lee Whitmore, "Spotlight: Shenandoah Conservatory Embraces Digital Technology," *Music Education Technology* 5, no. 4 (November/December 2007): 22.

[65]   Ibid., 21.

Impact™, utilizes the *SmartMusic®* evaluation tool. Because *SmartMusic®* has become increasingly popular throughout the United States, teachers and students are required to understand when and to what extent the *SmartMusic®* assessment feature can be used to effectively evaluate student performance. Because the *SmartMusic®* assessment feature is intended to advance student achievement, teachers can benefit from knowing when the use of the *SmartMusic®* assessment feature can be beneficial and when its use could yield evaluative results that detrimentally affect student performance. Chapter 4 explores the potential of the *SmartMusic®* assessment feature and its uses for performance evaluation especially when applied to the trombone.

CHAPTER IV

SMARTMUSIC® ASSESSMENT OF TROMBONE PERFORMANCE

SmartMusic® *Impact*™ and the assessment feature utilized by *Impact*™ were

designed to improve the teaching and learning of music class curricula.[66] Theberge (1997)

stated, "The ultimate test of a product in the synthesizer or music software industry today

is not its technical excellence but its market success."[67] *SmartMusic*® has passed this

ultimate test due to its market success, but its technical excellence must be proven as well

for the evaluation component of the software to be deemed effective. Therefore, the need

for *SmartMusic*® to assess student performance accurately and effectively is imperative.

Recalling the criteria for student trombone evaluation as presented in Chapter II, a

discussion of the *SmartMusic*® assessment feature as an evaluation tool addresses

possible strengths and weaknesses as they apply to student trombonists.

An aforementioned issue when evaluating trombone student performance is

whether or not the performer is visible to the evaluator. When the *SmartMusic*®

assessment feature functions as the evaluator, the evaluator is unable to see the trombone

student during the performance. One advantage of this evaluation method is that the

SmartMusic® assessment feature is incapable of discriminating against the student with

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[66]   Canadian Musician, 65.

[67]   Theberge, 153.

regard to age, race, gender, or any other criteria. The *SmartMusic®* assessment feature also is incapable of favoring specific students over others because the program cannot personally know the students by any criteria other than the sound that passes through the microphone while the performance is recorded.

Disadvantages also exist regarding the *SmartMusic®* assessment feature as a method of blind evaluation for trombone students. The *SmartMusic®* assessment feature is incapable of recognizing visual elements of the student performance that may hinder student progress and pedagogical development. Such elements include but are not limited to: improper breathing habits, incorrect posture, awkward grip of the trombone, and an ineffective hand position for slide movement. The *SmartMusic®* assessment feature also is incapable of recognizing visual elements of the student performance that may be distracting to an audience in a performance setting. Such elements include but are not limited to: excessive body movement, excessive foot tapping, and awkwardly low or high horn angles. Advantages and disadvantages exist with regard to the fact that the *SmartMusic®* assessment feature blindly evaluates trombone students.

The *SmartMusic®* assessment feature evaluates aural criteria exclusively. Wardlaw's aural criteria for brass performance evaluation are: articulation, rhythm, tone, intonation, and musicianship/style.[68] Because they are essential to trombone performance evaluation, these criteria are necessary to discuss in the *SmartMusic®* assessment of trombone student performance.

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[68] Wardlaw, 148.

In this study, the *SmartMusic®* assessment feature was used to grade seventeen separate recordings of an etude. The selected etude was #97 entitled "Multiple Flats" from Accent on Achievement, Book 2. On the first recording, the subject performed the etude according to the notation and musical indications on the page. The *SmartMusic®* assessment feature graded this recording 100%. In each of the subsequent sixteen recordings, the subject intentionally altered the performance by changing one of Wardlaw's criteria for performance evaluation. The *SmartMusic®* assessment feature displayed a percentage score for each performance; the assessment feature also color codes the notes of the etude based on whether each note is deemed correct or incorrect. Green notes are notes that are deemed correct, and red notes are notes that are deemed incorrect. Black notes are also deemed incorrect, but these notes indicate that either the performer did not play these notes or that the microphone did not "hear" these notes. For these performances, the subject used a microphone designed for the use of *SmartMusic®*; the subject also clipped the microphone to the trombone bell to reduce the likelihood of black notes.

The first criterion of performance evaluation with which the subject experimented was articulation. The subject performed the second recording with one intentional deviation from the first recording. On this recording, the subject used an unclear "la" articulation syllable throughout the etude. This approach to articulation resulted in a somewhat imprecise tonguing style similar to slight *glissando*. The *SmartMusic®* assessment feature graded this performance 100%, which indicated that the *SmartMusic®* assessment feature did not measure and deduct points for imprecise articulation. A human

evaluator would unlikely grade this performance as high, because a score deduction is justifiable for improper tonguing throughout the etude.

On the third recording, the subject deviated from the first recording by playing the entire etude as a *glissando*. The subject breathed and reentered as necessary, but the subject did not tongue any notes throughout the performance. The *SmartMusic®* assessment feature again graded this performance 100%, which indicated that the assessment feature did not measure tonguing and note distinction.

The subject performed the fourth recording with one intentional deviation from the first recording. On this recording, the subject flutter tongued the entire etude. The *SmartMusic®* assessment feature graded this performance 97%. The 3% deduction was a result of the black D-flat that immediately followed another D-flat. This note was the only note in the etude that was the same as note that immediately preceded it. Although the subject flutter-tongued this note, the *SmartMusic®* assessment feature did not recognize this note. Despite the rapid flutter-tongue articulation that was inappropriate for this etude, the *SmartMusic®* assessment feature did not deem any other notes incorrect throughout this performance.

On the fifth recording, the subject deviated from the first recording by playing the notes as short as possible with tongue cutoffs to end each note. The *SmartMusic®* assessment feature graded this performance 100%. Because the notes were played as short as possible, the subject did not hold the notes out for their intended duration. The abbreviated duration was most evident with regard to the half notes, which were performed with a shorter duration than the value of a sixteenth note on this recording.

Although trombone players frequently release long notes early when a breath is necessary or when the style of the music is acceptable for playing long notes shorter than their full rhythmic duration, playing half notes as short as possible at a moderate tempo is not justifiable according to any musically educated human evaluator. The *SmartMusic®* assessment feature, however, did not deduct points for this issue, nor did the assessment feature deduct points for releasing each note abruptly with the tongue.

Chapter II identified subjective and objective sub-criteria for the articulation criterion of trombone performance evaluation. On recordings 2, 3, 4, and 5, the subject changed an aspect of articulation in each performance to see how each change affected the *SmartMusic®* assessment feature's evaluation. The *SmartMusic®* assessment feature did not deduct points from any of the recordings except for 3% of the score on the fourth recording. This deduction occurred while flutter tonguing; the *SmartMusic®* assessment feature did not recognize the sound of the second of two consecutive D-flats. No other score deductions occurred during any of these recordings. Although objective criteria exist for evaluating articulation in trombone performance, the *SmartMusic®* assessment feature does not utilize these criteria at all in its evaluation process. A human evaluator would likely deduct points from the subject's grade for these performances due to articulation problems that the *SmartMusic®* assessment feature did not recognize.

The subject performed the sixth recording with one intentional deviation from the first recording. On this recording, the subject played every note noticeably late. The *SmartMusic®* assessment feature graded this performance 14%. Despite the fact that the subject played all of the correct pitches in tune with clean articulation and appropriate

style, consistent playing behind the beat reduced the score by 86%. The 14% that was deemed correct resulted from notes that were somewhat behind the beat, but not to the extent that the other notes were behind the beat. The evaluation did not consider these notes wrong due to the fact that the notes were played within the *SmartMusic®* assessment feature's programmed parameters for rhythmic accuracy.

The subject deviated from the first recording on the seventh recording by playing constant eighth notes on the correct pitches throughout the etude. Eighth notes were still played as eighth notes, but quarter notes became two eighth notes, half notes became four eighth notes, and so forth. The *SmartMusic®* assessment feature graded this performance 100%. Despite the fact that the subject rearticulated notes that were supposed to be held, the *SmartMusic®* assessment feature did not deduct points for adding repeated notes.

On the eighth recording, the subject deviated from the first recording by swinging the eighth notes in a jazz style throughout the etude. The *SmartMusic®* assessment feature graded this performance 83%. The evaluation did not display any red notes for this performance; however, most of the eighth notes on the "and" of the swing rhythm registered as black notes. The *SmartMusic®* assessment feature did not "hear" these notes played in context of the etude.

Chapter II identified primarily objective sub-criteria for the rhythm criterion of trombone performance evaluation. On recordings 6, 7, and 8, the subject changed an aspect of rhythm in each performance to see how each change affected the *SmartMusic®* assessment feature's evaluation. Playing consistently behind the beat drastically reduced the grade to 14%, despite the fact that all other qualities of the performance were

essentially the same as the first recording that scored 100%. A human evaluator would unlikely reduce the grade for this performance so drastically, because late entrances were the only significant problem in this performance. Replacing long notes with repeated eighth notes did not cause the *SmartMusic®* assessment feature to deduct points from the overall grade, because the assessment feature still "heard" the beginning of each required note. Swinging the eighth notes reduced the grade to 83%, because the *SmartMusic®* assessment feature did not recognize some of the swung eighth notes due to the assessment feature's parameters for playing in time. The *SmartMusic®* assessment feature uses objective criteria for evaluating rhythm based on whether or not each note is played within an appropriate time frame according to the *SmartMusic®* assessment feature's programmed parameters. Therefore, performers are heavily penalized when they have a consistent rhythmic problem throughout the performance, including playing behind or ahead of the beat throughout the etude.

The subject performed the ninth recording with one intentional deviation from the first recording. On this recording, the subject intentionally performed the etude with a poor tone quality. The subject used inadequate breath support and stretched the embouchure while sticking the tongue far into the mouthpiece to achieve this tone quality. The *SmartMusic®* assessment feature graded this performance 100%. The uncharacteristic trombone sound did not disqualify any notes from being deemed correct according to the *SmartMusic®* assessment feature.

On the tenth recording, the subject deviated from the first recording by singing through the microphone rather than playing the trombone. The *SmartMusic®* assessment

feature graded this performance 93%. The 7% deduction was attributed to intonation flaws in the singing; this deduction was unrelated to timbre.

Chapter II identified primarily subjective sub-criteria for the tone quality criterion of trombone performance evaluation. On recordings 9 and 10, the subject changed an aspect of tone in each performance to see how each change affected the *SmartMusic®* assessment feature's evaluation. A human evaluator would likely deduct points from the performance grade when the subject produces an uncharacteristic trombone sound. Changes in tone quality did not reduce the *SmartMusic®* assessment feature's score for the performance, however, because the *SmartMusic®* assessment feature does not consider tone quality as one of its evaluation criteria.

The subject performed the eleventh recording with one intentional deviation from the first recording. On this recording, the subject played every note one partial too high throughout the etude. Despite the fact that all of the notes were played in the correct slide position and part of the overtone series of the correct note, the *SmartMusic®* assessment feature graded this performance 0%. The performance also included many of the correct melodic intervals, although the notes themselves were incorrect. A score of 0% for this performance would be highly unlikely from a human evaluator, because the only significant mistake that the subject made was staying on the wrong partial throughout the etude.

On the twelfth recording, the subject deviated from the first recording by playing all of the notes one partial below the correct note. The result was the same as that of the

tenth recording; the *SmartMusic®* assessment feature graded the performance 0% despite the fact that the slide positions and many of the melodic intervals were correct.

The subject performed the thirteenth recording with one intentional deviation from the first recording. On this recording, the subject played the entire etude an octave higher than the indicated notes. All of the notes of this performance were of the correct pitch class, and the melody of the etude was exactly the same but transposed up an octave. The *SmartMusic®* assessment feature graded this performance 0%. The *SmartMusic®* assessment feature's scoring method gave the subject no points for playing the correct intervals and pitch classes of this melody in tune, in time, with a characteristic tone quality. All of the notes displayed as red (incorrect) notes except for the last three notes. The *SmartMusic®* assessment feature did not "hear" these notes through the microphone; these notes displayed as black.

On the fourteenth recording, the subject deviated from the first recording by starting each note in tune but then quickly bending each note noticeably sharp or flat for the duration of the note. The *SmartMusic®* assessment feature graded this performance 97%. The 3% deduction occurred on a G-flat that the subject quickly sharpened. The G-flat immediately went sharp to the extent that this note sounded closer to a G. The *SmartMusic®* assessment feature determined that this note was a G and therefore incorrect. The *SmartMusic®* assessment feature deemed all of the other notes correct, because the software recognized the correct pitch at the beginning of each note.

The subject performed the fifteenth recording with one intentional deviation from the first recording. On this recording, the subject pulled the tuning slide out as far as

possible prior to starting the etude. The *SmartMusic®* assessment feature graded this performance 93%. The majority of the notes were deemed correct despite their flatness in pitch. Although the *SmartMusic®* assessment feature did not display any red or black notes after this performance, the 7% deduction was most likely due to notes that were so flat that they exceeded the *SmartMusic®* assessment feature's pitch parameters.

Chapter II identified primarily subjective sub-criteria for the intonation criterion of trombone performance evaluation. On recordings 11, 12, 13, 14, and 15, the subject altered an element of trombone playing that affects intonation to see how the *SmartMusic®* assessment feature evaluated these altered performances. Any notes that were close to a certain extent to the programmed pitch in even temperament were deemed correct, and any notes that deviated from the programmed pitch to a certain extent were deemed incorrect. This evaluation system resulted in extreme score deductions for the performances in which performed notes were consistently out of tune from the programmed pitches. Although Wardlaw did not specify correct notes and incorrect notes in his performance grading rubric, correct notes and incorrect notes are classifiable in the intonation criterion. Wrong notes cannot be in tune with the *SmartMusic®* assessment feature's programmed pitches. Therefore, any wrong notes regardless of their context are deemed incorrect with no partial credit according to the *SmartMusic®* assessment feature. This grading tendency results in the automatic failing grade of any student who has a major issue regarding correct notes or intonation throughout the performance.

On the sixteenth recording, the subject deviated from the first recording by playing the etude very loud instead of the indicated *mezzo piano* dynamic level. The

SmartMusic® assessment feature graded this performance 100%. The *SmartMusic®* assessment feature did not evaluate the volume of the subject's sound; therefore, no score deductions occurred.

The subject performed the seventeenth recording with one intentional deviation from the first recording. On this recording, the subject played more expressively than on the other recordings by making noticeable dynamic contrast, using much vibrato, and emphasizing downbeats and other prominent notes. The *SmartMusic®* assessment feature graded this performance 100%. None of the aforementioned forms of musical expression affected the *SmartMusic®* assessment feature's evaluation of the performance.

Chapter II identified primarily subjective sub-criteria for the musicianship/style criterion of trombone performance evaluation. On recordings 16 and 17, the subject altered an element of trombone playing that affects musicianship/style to see how the *SmartMusic®* assessment feature evaluated these altered performances. Alterations in dynamics, phrasing, style, and expressivity had no effect on the *SmartMusic®* assessment feature's evaluation of the subject's performances.

CHAPTER V

SUMMARY, CONCLUSIONS, AND SUGGESTIONS

Evaluation is a broad term that encompasses subjective assessment, objective assessment, or both of these types of assessment. Kinney (2009) stated that "Because the evaluation of music performance is so intertwined with the processes of learning and teaching music, it is no wonder that this topic is of primary importance to music educators and researchers."[69] Teachers approach evaluation effectively when they seek to accurately determine the extent to which each student has learned the material. Evaluation is ineffective when teachers inadequately address the criteria that measure student learning of relevant class material. In music, successful teachers comprehensively evaluate performance as a means of determining student achievement and progress.

A need exists for music performance evaluation to effectively and accurately assess performance criteria that are essential to having a successful instrumental performance. When the evaluator is assessing trombone performance, performance criteria that are relevant to the trombone must clearly be identified. Trombone performance criteria may include visual and aural criteria. Visual criteria include: slide hand position, grip of the trombone, horn angle, and body movement throughout the performance. Some visual criteria are distracting to audiences, whereas other visual criteria impair the performer's ability to effectively play the trombone. By addressing

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[69] Kinney, 323.

visual criteria in the evaluation process, teachers provide students with information that may be helpful for future performances. The disadvantage to allowing the evaluator to see the performer is that discrimination and favoritism may occur.

In music performance, aural criteria are more important and more necessary for evaluation than visual criteria. Wardlaw devised a rating scale for brass instruments to assess the following aural criteria: articulation, rhythm, tone, intonation, and musicianship/style.[70] The five criteria are each divided into sub-criteria, some of which require objective evaluation and some of which require subjective evaluation. Wardlaw's criteria allow for a balanced and comprehensive system of aural evaluation for trombone performance.

SmartMusic® is a computer program that has grown significantly in popularity since the program was first released. Band directors and other music teachers nationwide have used this program with their students. In its current state, *SmartMusic®* is practical, convenient, and inexpensive. Music teachers and students have utilized the numerous features that are inclusive to the *SmartMusic®* subscription plan, including the assessment feature. Because the *SmartMusic®* assessment feature has become convenient and widely used in music education, a need exists to determine the extent to which this assessment feature is effective for the evaluation of music students. This study focuses specifically on music students who play the trombone.

Assuming the role of test subject, the author recorded seventeen performances of an etude using the *SmartMusic®* assessment feature. The first recording was

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[70] Wardlaw, 148.

appropriately played with no noticeable mistakes; the *SmartMusic®* assessment feature graded this performance 100%. The subsequent sixteen recordings each contained an alteration of one of Wardlaw's brass performance criteria. The purpose of this section was to determine the extent to which each altered performance criterion influenced the *SmartMusic®* assessment feature's grade for each performance. The printouts and a brief explanation of each recording appear in Appendix A of this document.

Results indicated a high frequency of exceptionally high grades classifiable as A and a high frequency of exceptionally low grades classifiable as F. On each recording except for the first recording, exceptionally high grades typically indicated performance problems not recognized or not effectively addressed by the *SmartMusic®* assessment feature. Exceptionally low grades indicated performances in which the subject's score was excessively penalized due to one consistent performance problem that the *SmartMusic®* assessment feature deducted points for throughout the performance.

The extreme discrepancy in scores was due to the fact that the *SmartMusic®* assessment feature evaluates performance based on correct pitches played at the correct time. The *SmartMusic®* assessment feature determines whether each note is correct or incorrect based on a certain amount of leeway that this assessment feature allows with regard to pitch and rhythm. Any note that is sufficiently close to the programmed pitch and sufficiently close to the designated rhythm is deemed correct, whereas all notes that are played outside of these parameters with regard to pitch or rhythm are deemed incorrect. The *SmartMusic®* assessment feature displays each note as entirely correct or entirely incorrect; no partial credit is given for incorrect notes that display as red.

Human evaluators or adjudicators have the capability to evaluate performances according to objective or subjective criteria. Computer programs are limited to objective criteria in the evaluation process, because they collect quantitative data rather than qualitative data. Although objective sub-criteria are possible for all five categories of aural performance evaluation criteria discussed in this project, the *SmartMusic®* assessment feature only utilizes a small subset of possible objective criteria for its evaluation process. Consequently, the few objective criteria that the *SmartMusic®* assessment feature assesses have complete control of each performer's grade, whereas all other criteria do not affect each performer's grade. As a result, these criteria drastically lower the trombone student's grade when he or she is inaccurate with regard to pitch or rhythm throughout the performance. Pitch also includes whether or not the correct note is played in the correct octave.

Advantages exist with regard to using the *SmartMusic®* assessment feature to evaluate trombone student performance. The *SmartMusic®* assessment feature evaluates blindly and is therefore incapable of discriminating against certain students or favoring certain students with regard to factors that are irrelevant to performance. The *SmartMusic®* assessment feature is a consistent computer program with precise evaluation parameters that do not change from performance to performance. Consistency is beneficial to any method of performance evaluation, because "If an individual is not able to be consistent in evaluative tasks, it is difficult to place any validity in that individual's assertions about the quality of a music performance."[71] The *SmartMusic®*

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[71] Kinney, 322.

assessment feature is also easy to use and convenient for students who can use the program at home or at school. The *SmartMusic®* assessment feature effectively assesses notes that are significantly out of time, significantly out of tune, or the wrong note entirely. By color coding these notes red after the performance, the *SmartMusic®* assessment feature informs the student that either the pitch or the rhythm of the performance is imprecise. The red note feature and the correct note percentage are useful tools for beginning students or inexperienced students whose focus is distinctly upon playing the correct pitches with the correct rhythms. The recording and evaluation features are also useful and convenient for teachers. Teachers use the grade book feature, *Impact,* to keep track of student progress and to listen to recorded student performances at their convenience. Teachers also have the capability to override any of the *SmartMusic®* assessment feature's performance grades that they consider inaccurate or inappropriate.

Disadvantages also exist with regard to using the *SmartMusic®* assessment feature to evaluate trombone student performance. The *SmartMusic®* assessment feature evaluates blindly and is therefore incapable of visually addressing criteria that hinder student performance. The *SmartMusic®* assessment feature is also incapable of subjective evaluation, and this assessment feature only evaluates with regard to pitch and rhythm on a note-to-note basis. The notes do not have to be held for any duration greater than a fraction of a second, nor do the notes have to possess a characteristic tone quality. The notes do not have to be played with appropriate articulation, nor do they have to be played at an appropriate volume or in an appropriate style. An evaluation should not only

be accurate but also comprehensive and relevant to instructional material.[72] The *SmartMusic®* assessment feature is accurate at assessing two performance criteria, but this assessment feature does not assess any other criteria that students learn in music class or private lessons. The *SmartMusic®* assessment feature also is not as comprehensive as a human evaluator.

The *SmartMusic®* assessment feature's grading criteria do not motivate students to improve most aspects of their playing. Students who play with an uncharacteristic tone are not motivated to improve their tone if they receive a perfect or nearly perfect score on the evaluation. Likewise, students who articulate improperly or students who have other improper playing habits are not motivated to improve these areas of their playing if they achieve perfect scores on their *SmartMusic®* assessments. Rice (2003) stated that "If the grading system is flawed, the student becomes preoccupied with the grading system and does not focus on the task at hand."[73] When the *SmartMusic®* assessment feature is the grading system, students will likely attempt to achieve a high score on the evaluation without the desire to improve any performance deficiencies that the *SmartMusic®* assessment feature does not address.

Teachers who promote the *SmartMusic®* assessment feature and students who use the *SmartMusic®* assessment feature must realize that this feature is not put to proper use when the grading feature is used as a substitute for human evaluation. Criswell stated

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[72] Boyle and Radocy, 7.

[73] Daniel Everette Rice, "Motivating Individual Achievement in Undergraduate Performance Study: a Consensus Among Trombone Teachers" (doctoral diss., University of North Carolina at Greensboro, 2003), 60.

with regard to *Impact*™ that "The teacher can dismiss or confirm the assessment after listening to a recording of the student's performance."[74] The recording feature allows the teacher to listen to each student and determine whether or not the *SmartMusic*® assessment feature's grade accurately reflects each student's performance. Based upon the results of this study, teachers are acting appropriately when they listen to the recording and override any student's *SmartMusic*® assessment if the grade seems inappropriate for the performance.

This project was not a statistical study, and the results of the procedures were not statistically significant. This project, however, could be the basis of a statistical study in the future. This study could be realized by using the *SmartMusic*® assessment feature to grade student performances and by also using a panel of human adjudicators to grade the same student performances based on the *SmartMusic*® assessment feature's recordings. Inter-judge reliability could be determined, and measures of central tendency and measures of variability could be determined from the set of scores evaluated by the *SmartMusic*® assessment feature and the set of scores evaluated by the panel of human adjudicators. The two sets of scores could be compared to address similarities and differences between human evaluation and the *SmartMusic*® method of computerized evaluation.

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[74] Criswell, 46.

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APPENDIX A

SMARTMUSIC® ASSESSMENT GRADE SUMMARIES

Performance 1: 100%

This performance consisted of proper playing of #97 entitled "Multiple Flats" from Accent on Achievement, Book 2. *SmartMusic®* recognized all of the notes as correct.

Performance 2: 100%

Despite the unclear and imprecise "la" articulation throughout this performance, *SmartMusic®* did not recognize any errors.

Performance 3: 100%

The subject performed the etude entirely as a glissando, except for a necessary breath taken after the first ending. *SmartMusic®* did not recognize any errors.

Performance 4: 97%

This performance was entirely flutter tongued. *SmartMusic*® deducted points for the repeated D-flat; this note (circled above) was black on the assessment.

Performance 5: 100%

The subject performed all notes as short as possible with tongue cutoffs to release every note. *SmartMusic*® did not recognize any errors.

Performance 6: 14%

The subject performed every note late throughout this performance. Notes deemed incorrect (circled above) were red on the assessment. The notes that were deemed correct were only marginally late.

Performance 7: 100%

The subject played constant eighth notes throughout this performance, thereby repeating any notes of longer duration. *SmartMusic®* did not recognize any errors.

Performance 8: 83%

The subject swung the eighth notes in a jazz style throughout this performance. *SmartMusic®* did not "hear" most of the swung eighth notes that were shorter in duration. These notes (circled above) were black on the assessment.

Performance 9: 100%

The subject produced a poor, uncharacteristic tone quality throughout this performance. *SmartMusic®* did not recognize any errors.

Performance 10: 93%
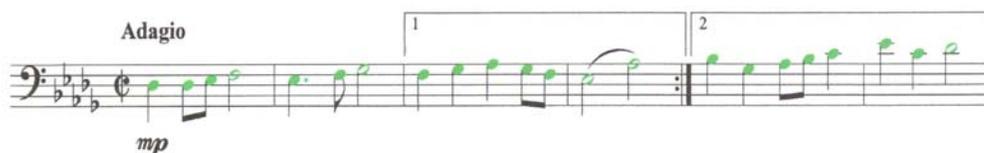
The subject sung the etude instead of playing the etude on the trombone. Although the assessment showed no errors, the 7% deduction was likely due to vocal intonation flaws.

Performance 11: 0%
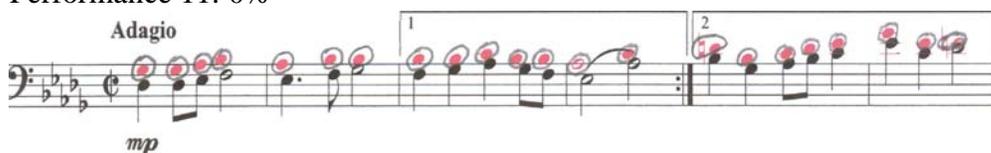
All of the notes throughout this performance were played one partial too high. *SmartMusic®* determined that every note was incorrect; these notes (circled above) were red on the assessment.

Performance 12: 0%
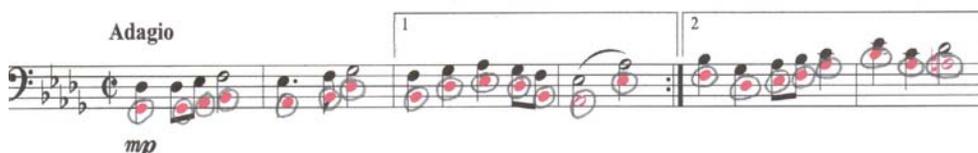
All of the notes throughout this performance were played one partial too low. *SmartMusic®* determined that every note was incorrect; these notes (circled above) were red on the assessment.

Performance 13: 0%

All of the notes throughout this performance were played an octave above the indicated pitch. *SmartMusic®* determined that every note was incorrect; these notes (circled above) were red on the assessment. *SmartMusic®* did not "hear" the last three notes, however, and these notes were black on the assessment.

Performance 14: 97%

The subject bent every note sharp or flat throughout its duration. *SmartMusic®* detected one note that did not start in tune; this note (circled above) was red on the assessment.

Performance 15: 93%
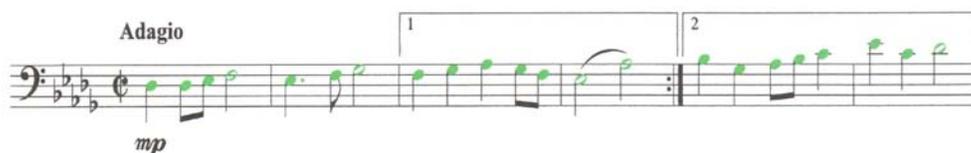
The subject pulled the trombone tuning slide all the way out for this performance. The assessment did not display wrong notes, but 7% was deducted most likely due to intonation flaws.

Performance 16: 100%
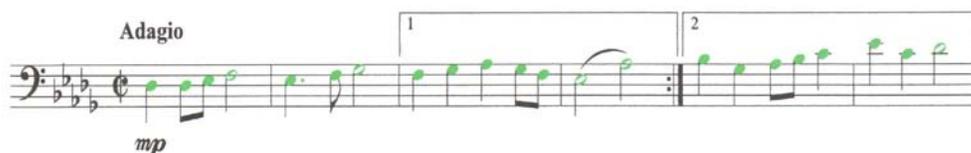
The subject played harshly and inappropriately loud throughout this performance. *SmartMusic®* did not recognize any errors.

Performance 17: 100%
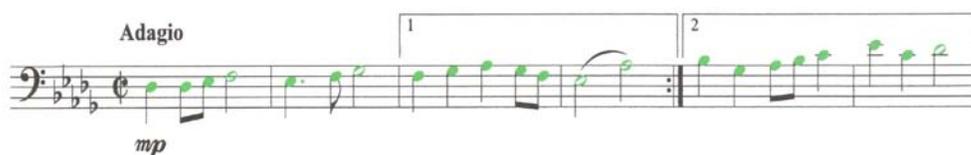
The subject made advanced stylistic and musical decisions throughout this performance. *SmartMusic®* did not recognize any errors.