Aural dictation affects high achievement in sight singing, performance and composition skills

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Abstract

The nature of skill acquisition has long been of interest to music educators. This study considers the research context for relationships between aural dictation, sight singing, performance and composition skills. Then, relationships between these skill areas are quantitatively investigated using data from the Australian New South Wales Music 2 2010 and 2011 HSC examination tasks, which take place in the final year of secondary schooling. The results from the HSC data were analysed in three ways: raw results for each isolated skill, correlation analysis for each skill combination and comparative analysis of only top-achieving students. The study found that the highest correlations were between aural dictation and sight singing. Further analysis of top achieving students found that high achievement in multi-part aural dictation was the best predictor of high achievement in the other skill areas.

Key words: aural dictation, sight singing, performance, composition, correlational analysis, Higher School certificate

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Introduction

As a performing musician, secondary school music teacher and tertiary lecturer, I enjoy participating in and facilitating musical development in others. I have always believed that the best teachers are those who continuously strive for excellence in the skills that they endeavour to teach, both for themselves and on the part of their students. In recent years I have made an effort to compose each day, continue personal instrumental practice and engage in regular listening of new and familiar repertoire. As I participated in these activities along with my teaching commitments, I developed an interest in the way these activities were inter-connected. I noticed that my thinking patterns, when practising on my instrument, were affected by pieces to which I had recently listened as well as those I had been composing. I also noted that my own compositions were changing as I performed different repertoire and listened to new pieces. My ability to appreciate music deepen with my developing composition and performance skills. It seemed that while each activity harboured its own distinct set of skills, these activities offered benefits and a deeper musical understanding when combined. I began to question the manner in which these areas may be connected. Could the connections be expressed quantitatively? Are there measurable benefits when musicians participate in and achieve at high levels in a broad range of musical activities? Do any skills function as a predictor of success in other musical areas?

To explore these questions I began to consider how these connections might be observed and quantitatively analysed in other musicians, particularly young artists. My experience as a secondary school music teacher in NSW, Australia, provided an educational context for these observations. It became apparent that the students preparing for the Music 2 Higher School Certificate (HSC) Examinations, as outlined by the NSW Board of Studies Syllabus, are required to develop all of these skills. These students are expected to demonstrate musicological competence through various analytical tasks including aural dictation, sight singing, presenting a performance and submitting a composition. Of particular interest was the way aural dictation and sight singing skills contribute to the composition process, and also success as a performer.

This study sought to explore relationships between aural dictation, sight singing, performance and composition in a quantitative manner. Initially, an investigation of research relevant to these skill relationships was undertaken. The qualitative nature of past research provided a context for the quantitative nature of this study. The results from the NSW HSC Music 2 Examinations are then presented in three ways: histograms of the raw results for each skill, correlation graphs for each skill combination and pie charts comparing only top achieving students. These results are then discussed within the context of the relevant literature, demonstrating implications for educators.

For the purposes of this article, the term *aural dictation* refers to the skill of hearing and notating music using traditional Western notation. The term *multi-part* refers to dictations with two or more layers of sound, of which one layer is to be singled out for notation.

Relevant literature

The acquisition of a wide range of musical skills is of great value for the developing musician. While much research advocates the benefits of multiple skill development this is often on the basis of unstated or untested assumptions. This discussion explores literature contributing to the nature of skill relationships in the areas of aural and visual analysis, performance and composition skills.

Skills involved in aural and visual analysis

Music educators and theorists strongly advocate the importance of developing aural and visual analysis skills. These skills have been described as "the foundation upon which all higher level skills are built" (Hansen, 2005, p. 5). Wheeler (2007, p. 35) further states that "ear and eye skills are foundational to the whole enterprise of music making." The purpose for fostering these foundational skills is "to develop in students the ability to recognize and understand musical relationships" Sisley, 2008, p. 15). The key idea conveyed here is that relationships exist among the many musical disciplines such as analysis, performance and composition. The development of aural and visual analysis skills is seen by Sisley (2008) to be an integral part in aiding the understanding of these relationships. Klonoski (2006, p. 56) claims that the goal of this training focus is "to teach students to integrate the various musical components of real compositions into a meaningful, informed listening experience." This broadly based support for the importance of aural and visual analysis is also advocated by Karpinski (2000, p. 4); "music listeners who understand what they hear are thinking in music. Music readers who understand and auralise what they read are thinking in music." This concept of "thinking in music" (Karpinski, 2000, p. 4) or "thinking in sound" (Gordon, 2003) is audiation.

Audiation is a skill that encompasses a wide variety of musical endeavours including many aspects of performance and composition (Gordon, 2000, p. 12). Gordon (2003) argues that audiation forms the basis of musical development. He advocates the pedagogical

practice of teaching musical acquisition with the same principles as language development. He explains that "audiation is to music what thought is to language" (Gordon, 2003, p. 25). Audiation is also described by Gordon (2000, p. 9) as "the assimilation and comprehension of the sound itself" or can be alternatively viewed as hearing and comprehending music in the mind when no sound is present (Hansen, 2005; Sisley, 2008). Klonoski (2006) firmly upholds the development of critical listening skills. Essentially, music is sound. Therefore the development of an attuned musical ear will no doubt strengthen the development of all other musical skills (Gordon, 2007).

Hansen (2005) underscores the importance of audiation as a foundational skill for the development of analysis, performance and composition. It is described as providing the basis for the variety of skills which are necessary for the rich development of musicianship (Cross & Hiatt, 2006). Audiation is considered a key skill for enabling musicians to reach their full musical potential (Gordon, 1999). Therefore, audiation should not be considered a skill particularly linked only with aural and visual analysis, but rather a foundation skill on which all other musical skills should develop.

While singing is considered extremely valuable for the development of audiation (Gordon, 2004), and music education in general (Tacka & Houlahan, 1995), sight singing is one of the foundational companion skills for aural dictation acquisition. Harrison et al. (1994) demonstrate through the methodology of their research on motivation and musical aptitude, that aural dictation and sight singing are skills which are extremely closely related. Sisley (2008) also emphasises the importance of linking the skills of aural dictation and sight singing, recommending students to develop a recognition of musical patterns through sight singing. Sisley (2008, p. 12) claims further that "unless students can sing, they will not be able to build a vocabulary of tonal patterns" that are imperative for aural dictation acquisition and aural analysis training. Telesco (1991) also strongly claims that sight singing is a vital way of improving aural analysis. Kodály (1974) emphasises the importance of sight singing and choral part singing for the development of any musical student. Damschroder (1995) and Cleland and Dobrea-Grindahl (2010) utilise this educational philosophy by providing aural dictation texts where sight singing is strongly integrated in the pedagogical approach.

While the relationship between sight singing and aural dictation may be strong, many situations where musicians will encounter aural dictation exercises require the musician to remain silent during the aural dictation process. These situations include high school and university examinations such as the Australian Music Examinations Board (AMEB), Associated Board of the Royal Schools of Music (ABRSM) and Trinity performance examinations. Thus, the student needs to develop the ability to complete aural dictations without vocalising. This ability is described by Gordon (2000, p. 9) as "notational audiation", the ability to make musical sense of a score by hearing it internally (Hansen, 2005). This skill is also explained by Sisley (2008, p.15) as "the ability to mentally create or recreate auditory images without singing, playing or otherwise outwardly reproducing the pitches". Kodály (1974, p. 192) quotes Robert Schumann on this point: "The good musician understands the music without a score as well as understands the score without the music. The ear should not need the eye, nor the eye the ear". Pitch internalisation (Sisley, 2008) and subvocalisation (Johnson & Klonski, 2003) are other terms which have been used to describe this same skill. Johnson and Klonski (2003) encourage musicians to experiment with silent whistling, silent singing or humming in an effort to develop notational audiation skills. As well as notating music through dictation, notational audiation also refers to the ability to notate music from recall, to read music while creating unfamiliar music and the process of notating improvised or composed

music (Gordon, 2001). Notational audiation is a vital skill for the completion of any aural dictation task.

A firm understanding of tonality is also important for the successful completion of any aural dictation or sight singing task. While Sisley (2008, p. 18) emphasises the "importance of mastery of tonal and rhythmic patterns," Portillo (2006) also states that an emphasis on post-tonal aural understanding is becoming increasingly important. Hansen (2005) comments on the benefits of using vertical structures when analysing post-tonal art music of the late 20th Century. However, Sisley (2008 p. 20) notes in her brief review of textbooks for aural analysis, that most texts "contain a small amount of post-tonal music examples, though not enough to be significant". As pedagogical tools for aural dictation have continued to be developed, more focus has been given to the inclusion of post-tonal aural development along with traditional tonalities (Cleland & Dobrea-Grindahl, 2010).

Another important skill that musicians need to develop for the completion of aural dictations is the ability to aurally identify single and multiple parts as well as multiple timbres. Karpinski (2000) claims that multi-part dictation, although difficult, is an important component of musical training that is often neglected and underdeveloped in musicians. Gregory (1990, 1994) assessed neurological processes and indicates that multi-part dictation retention is enhanced when dictations are related in key and employ traditional tonalities. Gregory (1994) also emphasises the importance of timbre for listeners attempting to distinguish between parts. Multi-part dictations are completed with much more ease by musicians when there are a variety of timbres used in the excerpt, rather than all parts of a single timbre (Gregory, 1994; Hansen, 2005). The ability to complete multi-part dictations is based on a well-developed aural understanding of harmonic conventions (Levin & Martin, 1998). Bowman and Terry (1994) and Cleland and Dobrea-Grindahl (2010) place a strong emphasis on developing harmonic relationships in an effort to aid the acquisition of melodic and multi-part dictations in a tonal context. Portillo (2006) has further applied this notion to post-tonal multi-part dictation by exploring approaches to sequencing trichordal and tetrachordal class sets.

For sight singing and aural dictation to be executed correctly, another vital skill is that of memorisation. The development of musical memory is complementary to notational audiation. Gordon (2003) explains that musical memory assists audiation, and audiation stimulates the development of musical memory. Sisley (2008) argues that long-term and short-term memory are both important aspects in completing aural dictations. Further, the tonal and rhythmic patterns absorbed in the long-term memory are instrumental for the successful function of the short-term melodic memory during an aural dictation exercise (Karpinski, 2000). Musicians have various ways of remembering the material needed to complete an aural dictation or sight singing task. Karpinski (2000) noticed that some musicians remember specific pitch intervals and others remember the general melodic contour. DeWitt and Crowder (1986) indicate that the mind tends to differentiate between melodic contour retention and intervallic information. As a result, many musicians have strengths in memorising certain aspects of a melody yet may need to develop skills in memorising other aspects. Karpinski (2000, p. 71) recommends "extractive listening" and "chunking". This is an approach supported by Hansen (2005) encouraging musicians completing aural dictations to first listen to then memorise what they hear. Only when an excerpt has been memorised should it be notated. Kodály (1974) also suggests that it is important to practice the art of dictation to the point where one can write down a melody after just one hearing. Clearly, the development of memory is an integral aspect of aural and visual analysis.

Like most musical endeavours, the acquisition of any skill can only take place through repetitive practice (Sisley, 2008, p. 18). Henry and Killian (2005) investigated the benefits of practice for improving sight singing. High school musicians were given two melodies to sight sing, one with a short preparation time and one without. Significantly higher accuracy was observed when students were given time to practice. Further, successful students were often involved in a variety of other musical activities which, explicitly and implicitly, provided opportunities to improve sight singing skills. The large quantity and continued production of aural analysis text books (Warburton, 1971; Bowman & Terry, 1993; Damschroder, 1995; Cleland & Dobrea-Grindahl, 2010) clearly demonstrates a recognition that musicians need to practice in order to improve.

For regular practice in aural dictation and sight singing to be most beneficial, it is imperative that musicians develop the ability to detect errors (Sisley, 2008). Crawley et al. (2002) found that musicians and non-musicians responded similarly to subtle changes in three-part listening challenges, indicating that many people develop error detection skills without formal training. Killian (1991) found that for high and medium scoring sight singers, there were no significant differences between sight singing and error detection ability. The ability to detect errors is an important skill for aural dictation and sight singing.

Another important aspect associated with error detection is the speed of acquisition. Sheldon (1998) researched the effects of multiple listenings on error detection for four-part multi-timbral listening excerpts. Participants were given three listenings and after each they identified any mistakes noticed on a provided score. While most participants were able to find errors in the top two voices, most difficulty occurred when trying to identify errors in the bottom voice. Further difficulty occurred when excerpts were given in a polyphonic texture. Bigand et al. (2000) found that participants were better able to detect errors in polyphonic music when the keys of the tunes were identical or closely related. If the keys were unrelated, participants benefited from repeated listening, and from hearing parts separately. Sheldon (1998) found that error detection ability is improved with the development of sight singing and multi-part aural skills training. Error detection is therefore a vital skill for the successful completion of aural dictation and sight singing exercises.

The process of completing an aural dictation or sight singing task should be wholistic, drawing on a variety of skills (Klonoski, 2006). For a musician to successfully complete a task they will inevitably use an integrated approach employing notational audiation, memorisation and error detection. These skills are imperative for melodic and multi-part dictations. However, the ability to complete multi-part dictations has been shown to be more difficult, requiring a high level of proficiency in the skills identified in this discussion. The integrated nature of the skills required for aural dictation and sight singing imply the possibility of further relationships with other significant musical disciplines such as performance and composition.

Skills involved in performance

A wide range of sub-skills contribute to performance skill acquisition (Parcutt & Macpherson, 2002). However, this discussion isolates research relating to the skills that are primarily related to the other focus disciplines of this study.

The development of aural and visual analysis skills are fundamental functions for any performer. Westney (2003) encourages performers to recognise the aural implications of a performance. Westney (2003) also stipulates that performance practice is enhanced through a developed sense of aural awareness. Williamon (2004, p. 88) further advocates a balance between "playing practice" and "non-playing practice" where the well-developed ear will contribute to the practice routine through aural and visual analysis.

Non-playing practice is also recommended by Rosenthal et al. (1988) and Cross and Hiatt (2006). Silent visual analysis and notational audiation are described as being particularly important for developing a meaningful musical performance. Audiation also plays an important part in developing performance skills (Gordon, 2003). In performance, audiation is "when the ears become more important than the fingers" (Gordon, 2000, p.12). Williamon (2004, p. 92) stresses the benefits of aural development for communication through performance: "in order to exploit all the possible cues inherent in a score, performers should activate their analysis and ear training skills". Sternbach (2009) also argues that developing acute aural analytical skills will help improve performance accuracy, resulting in less practice time and more confident musical performances.

Aural and visual analysis can also play a major role in the way performers learn new repertoire. McPherson (1996) studied relationships between a variety of practice strategies, including aural memorisation, as a means of learning new pieces. While the development of aural analysis contributes to improved accuracy and better practice strategies, Highben and Palmer (2004) also found that pianists with higher aural analysis skills were able to perform better by memory. Kodály (1974, p. 187) emphasises the role of aural analysis for internalising a piece of music: "your pieces must not be in your ten fingers only: you must also be able to hum them without a piano." Juslin (2000) also advocates the importance of aural analysis for those listening to and appreciating musical performance. O'Toole (2003) provides a resource for performance ensemble directors focusing on an interdisciplinary approach to performance acquisition and aural analysis in an ensemble setting. Brockmann (2009) also presents a musical workbook which conveys a philosophical link between the acquisition of aural analysis and performance.

Along with the development of aural analysis skills, sight singing is known to be a beneficial aspect of visual analysis for enhancing performance practice. Bernhard (2003) comprehensively reviewed literature which indicated significant links between sight singing and improved performance skills. This idea is supported by Bruser (1997) and Sternbach (2009). Bruser, (1997) indicates that singing is a particularly important skill for performance development on instruments such as the guitar and piano as these instruments do not require air flow for pitch production. Nor do they require minute pitch adjustment as is necessary on other string instruments. Singing therefore aids the development of a more natural and musical tone (Sternbach, 2009). While sight singing has been advocated as a beneficial aspect of any stage of performance development, Rosenthal et al. (1988) found that as musicians mature, the strength of correlation between sight singing and other practice conditions improves.

Another skill integrated with performance development processes is that of memorisation. Although the area of performance research and memory is vast and beyond the scope of this study, it is worth briefly noting a few studies of particular relevance. Palmer (1997) investigated the links between performance and cognitive motor skill development, as related to memorisation and performance perception. McPherson (1996) also found that relationships between various performance skills, including memorisation, strengthen as musicians mature. Gordon (2003) argues that the difference between musical memory and memorisation is the ability to audiate. For example, when a mistake is made during performance, the way this is dealt with will demonstrate either memorisation or musical memory: "For the child who has memorised there are wrong notes. For the child who is audiating there are appropriate solutions" (Gordon, 2003, p. 30). Musicians who have a well-developed musical ear also tend to excel in memorised performances (Highben & Palmer, 2004). Memorisation is also encouraged as a way of improving performance communication (Williamon, 2004).

Therefore, memory is not only an integral part of performance acquisition, but also a significant contributor to the success of the performance.

Improvisation represents an important interdisciplinary link between composition and performance (Prouty, 2006; Keller et al., 2001). Improvisation is a skill that is important for the development of the performer and the composer (McPherson, 1996). Brockmann (2009) presents an example of a pedagogical text which is built upon philosophically linking aural analysis, composition through improvisation, and performance. Brockmann (2009, p. viii) states that one of the main aims of his text is to show "how to make connections between music theory, aural skills concepts, and performance." Elliott (1995, p. 165) suggests that performance and composition are linked through the process of interpretation: "Performing a musical work is analogous to quoting someone else's words in order to assert something. A performer performs a musical composition in order to express his or her personal understanding of that composition". This process of interpretation requires an understanding of both performance and composition. Brindle (2002, p. 2) explains, "a performer should be able to compose well enough to know what is behind the notes… like the scaffolds behind a stage set". Thus, composition is a highly beneficial skill for the performer seeking to develop insightful performances.

Skills involved in composition

The multitude of skills that are needed for a musician to develop as a performer can also be noted in the literature focusing on compositional development. Most researchers identify compositional strategies that are either aural or performance based.

Compositional methods are often taught alongside a collection of other disciplines including aural analysis and the study of traditional Western harmony. Jamini (2005) provides a workbook integrating compositional technique with traditional harmony through aural and visual analysis. Gorow (2009) also provides an example of a training method that incorporates aural and visual analysis as an approach to composition. Gorow (2009, p. 4) aims to "combine the principles of music theory, composition, orchestration and transcription into one coordinated system of integrated techniques." Gorow (2009) recommends a variety of skills for development including the ability to: perceive and notate a large variety of musical styles, excel in improvisation and composition processes, communicate effectively through music notation, develop an efficient compositional sketch technique and notate musical ideas without the aid of a musical instrument. While this list encompasses a vast range of skills, there is an underlying expectation that composition students develop highly complex aural and visual analytical skills. Notating musical ideas without the aid of an instrument combines confident aural dictation skills with notational audiation and/or sight singing abilities. Kodály (1974, p. 191) states, "it is first and foremost the composer who needs an internal ear as keen as possible" and he strongly encourages musicians to compose away from the piano, doing "everything in your mind first" (Kodály, 1974, p. 196). Cope (1997) also emphasises broad listening, with scores, as a means of equipping and stimulating the composer's musical imagination. Further, he encourages musicians to develop the ability to read and notate music quickly and be a avid sight readers using both notational audiation and instrumental assistance. Shoenberg (1967) encourages the development of acute aural analysis skills to assist in self-criticism. Thus, the development of a range of aural and visual analysis skills are of vital importance for the composer.

There are many aspects of performance practice that can benefit the composer. One example is the fusion of performance and composition through the art of improvisation. Azzara (1993) found that the development of improvisation skills

directly correlates with higher level performance skills. Historically, these benefits were particularly evident in those musicians who were both composers and performers. Brindle (2002, p. 2) comments: "performers may have to improvise. This supreme form of spontaneous composition was once the greatest proof of musicianship." During the nineteenth century if a performer was not performing their own compositions, it was a common view that the performer should somehow take on the soul of the composer to ensure the most successful performance (Hunter, 2005). Quality improvisation is an example of acutely combined performance skills with aural analysis, demonstrating a deep comprehension of compositional technique (Prouty, 2006). In many cases the skill of sight reading is upheld as an important aspect of performance which also assists the development of the composer (Cope, 1997; Jamini, 2005).

Performance experience can also have a positive influence on communication through the compositional technique of score writing. The process of developing a score is described by Elliott (1995) as being deeply culturally contextual. The development of a score relies on expression within a particular way of thinking that is common among a specific group of people. Score development not only conveys the intention of sound, but also stipulates the actions of the performers. It is therefore necessary for the composer to have a sensitive awareness of the role of the performer.

Implications for this study

This discussion reveals the interconnected nature aural and visual analysis, performance and composition. However, while the relationships between these skills have been noted both pedagogically and professionally, they remain empirically untested. While much literature assumes relationships between all four skills, aural and visual analysis skills are most often implicitly identified as fundamental components of performance and compositional development. Therefore, this study is primarily concerned with scrutinising the assumption that there are strong relationships between aural and visual analysis, performance and composition. While much of the literature advocates the benefits of multiple skill development, this was often through qualitative research methods or through unstated assumptions. Therefore, quantitative analysis strategies were devised to further investigate relationships between these skill areas.

Research methodology

The advantages of the quantitative methodology chosen are best understood in the context of the research aims earlier stated. The quantitative method allows for the determination of numerical relationships between aural dictation, sight singing, performance and composition. This study was completed through three processes: collating the raw results from the NSW HSC Music 2 Examinations into histograms, correlation graphs devised for each skill combination and pie charts comparing only top achieving students. The details of the quantitative method used in this project are outlined, along with the specific project design and instrumentation. This is followed by a discussion of the assumptions and implications relevant to this aspect of the study.

Data collection strategies

This study was designed to investigate relationships between aural dictation, sight singing, performance and composition. The quantitative research method was particularly appropriate for analysing data obtained from the NSW Board of Studies. The data collected for this research project is secondary data (Ackroyd & Hughes, 1992; Grix, 2010) in that it was recontextualised, through analysis, with a purpose different to that intended by the Board of Studies. Questions were selected from the 2010 and 2011 Music 2 HSC examinations,

in accordance with the aims of this study. The examination data was initially collected by the Board of Studies at examination locations around NSW. Examination scripts were sent to HSC marking centres to be marked and collated. The researcher was subsequently given access to those marks once all student identification had been removed. Once the results from these questions had been obtained correlational analysis was carried out for each of the six possible combinations of skill areas. As another means of examining possible relationships, the results for the top achieving students were also isolated and analysed.

Research instrument and participants

The research instrument for this study utilised the NSW 2010 and 2011 Music 2 HSC Examinations (NSW Board of Studies, 2012). Questions directly relating to aural dictation, sight singing, performance and composition were selected. For the aural dictation questions in both years, examiners gave marks out of five using no half marks. The 2010 aural dictation contained a multi-part eight bar excerpt from the *Petrouchka Ballet Suite* by Stravinsky. The 2011 aural dictation contained the single-part opening nine bars of the *Fugue in A major* (from *Prelude and Fugue BWV 536*) for Organ by J. S. Bach.

Examiners marked the sight singing components out of five and used half marks. Each examiner chose one of three excerpts for each student. All passages ranged just over an octave and included 4/4 and 6/8 time signatures. For 2010, two were in E minor and one in D major. For 2011, passages were in D major, E minor and Bb major. Passages were rhythmically simple with occasional semiquaver movement emphasising melodic and intervallic interpretation.

Examiners marked the performance and composition components out of fifteen with half-marks. Students presented a live performance and submitted a composition representing music composed in the past 25 years (NSW Board of Studies, 2009). For this research, 749 senior high school students participated in 2010, and 729 participated in 2011 (NSW Board of Studies, 2011). These large numbers of available participants provided a considerable statistical advantage.

Analysis strategies

As previously noted, data from the Music 2 examinations was analysed using three methods: histograms of individual skill results, correlational analysis for each skill combination involving the whole cohort, and comparative analysis for each skill combination involving only the top achievers. The second method involved the determination of correlation coefficients. In this study, Pearson's *r* was chosen as a means of calculating linear correlation (Rodgers & Nicewander, 1988). When using correlation as a tool for analysis it is important to consider the nature of positive and negative correlations. For example, if *a* has a positive correlation with *b*, then it would be expected that *b* would also have a positive correlation with *a*. Similarly, if *a* has a negative correlation with *b*, then it would be expected that *b* would also have a negative correlation with *a*. The strength of correlation is measured on a scale from -1 to 1 with 1 being a completely positive correlation and -1 representing anti-correlation. Both outcomes can also be represented in graphical form with a regression line. For this study, the marks from particular questions were treated as naturally occurring variables and all comparative combinations were analysed for the strength of correlation.

The third method isolated just the top achieving students in each skill area. Once the number of top achieving students in each skill area was identified, analysis was carried out to determine how many students were also top achievers in other skill areas. For example, from the students who were top achievers in aural dictation, the researcher identified how many students were

also top achievers in sight singing, performance or composition. This process was carried out for each skill pair to determine whether any one skill may act as a predictor of success in other skill areas.

Methodological assumptions and limitations

Some methodological assumptions influenced the development of this research project. First, it was assumed that students under exam conditions could provide data that is relevant to skills which are not necessarily confined to exam conditions. Second, the researcher assumed that students had prepared with similar diligence for all parts of the Music 2 Examination. While it is likely that students prepared for different sections of the examination with varying degrees of dedication, it is assumed that the large number of participants would average out any anomalies.

There are some limitations in this study due to the nature of the sample data, instrumentation and the quantitative methodology. Conclusions drawn from the data are limited because of the breadth of population for the study. The sample of students cannot be considered random. Students are either self-selected or recommended to this subject due to obvious musical ability. As a result of these considerations, one limitation that can be expected is distortion to the data sample. There were further limitations with the sight singing data. This was due to the random approach used by examiners in choosing which sight singing sample to give each student. The researcher was therefore unable to obtain information based on how students achieved for the three specific options for sight singing in each year.

Limitations also arise when using statistical analysis for human skills: "human beings are not like the objects of physical science and therefore cannot be quantified" (Ackroyd & Hughes, 1992, p.29). As quantitative research is largely unable to recognise the effects of conditions or human behaviours (Jackson & Taylor, 2007), one cannot fully measure the nature of the relationship between variables based purely on numerical significance. It is therefore important to draw conclusions within the broad context of music scholarship.

Results

Numerical data was collected from four parts of the Board of Studies Music 2 2010 and 2011 examinations. These represent the four focus skills: aural dictation, sight singing, performance and composition. The raw examination results for these areas are presented in histogram form. Correlation plots are then presented and discussed for each of the six possible combinations. Finally, the results for the top achievers in each skill area are also analysed and discussed.

Distribution histograms

An analysis of the distribution histograms for the 2010 and 2011 results provides a valuable context for further comparative discussions. All 2010 histograms show the marking spread for the 749 Music 2 students. Likewise, the 2011 histograms show the marking spread for the 729 Music 2 students. The particular requirements for each relevant part of these examinations are analysed in light of the distributions.

Aural dictation

The 2010 histogram (Figure 1) displays the broad features of a normal distribution. The most common mark was two or three out of five and five students received a mark of zero. This demonstrates a relatively high degree of difficulty. In contrast, the 2011 histogram was quite skewed and does not display a normal distribution. The most common mark was five out of five, with no students receiving zero. These factors demonstrate a significantly lower degree of difficulty for 2011.

Sight singing

The 2010 and 2011 sight singing results (Figure 2) show non-normal distributions. The most common student result was five, demonstrating a low degree of difficulty and highlighting a possible limitation in the assessment instrument. These distributions indicate that the potential of a large number of students still remains untested.

Performance

Both performance histograms (Figure 3) display similar non-normal distributions. The majority of marks were awarded between the scores of twelve and fifteen inclusive (for 2010, 64% and for 2011, 63%). Fifteen was the most common mark awarded. It is likely that many students sitting the Music 2 examination receive private tuition in performance, thus raising the standard of this component. As with sight singing, these distributions indicate that the potential of a large number of students still remains untested.

Composition

In comparison with performance, both composition histograms (Figure 4) display the broad features of a normal distribution. Even though the majority of marks awarded were between ten and fifteen (for 2010, 68% and for 2011, 67%), this distribution indicates a reasonable degree of difficulty.

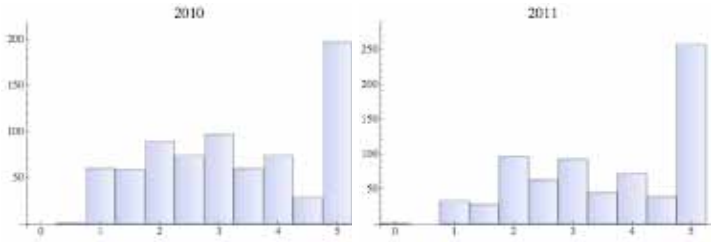


Figure 1: Histograms of 2010 and 2011 HSC aural dictation results: vertical axis shows number of students, horizontal axis shows marking range.

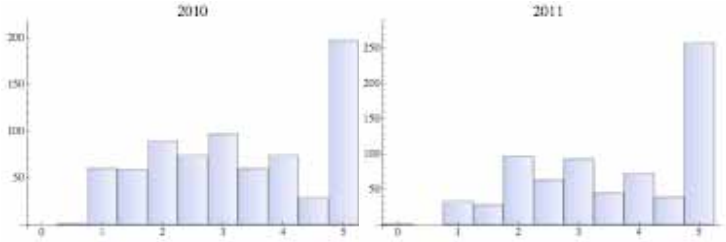


Figure 2: Histogram of 2010 and 2011 HSC sight singing results.

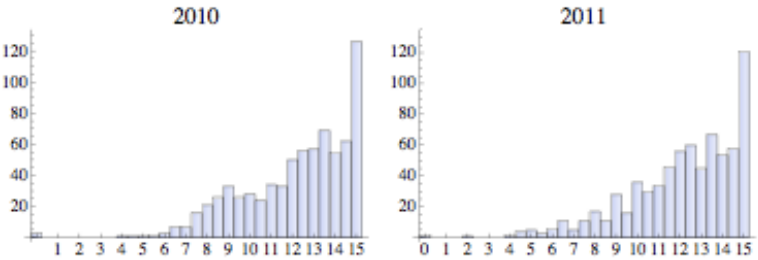


Figure 3: Histogram of 2010 and 2011 HSC performance results.

General distribution trends

Observations emerging from the histograms must be considered within the context of Australian educational practice and the nature of the student sample. The skewed nature of most histograms is likely a result of outcomes-based referencing (Berlach, 2004; Dunn et al., 2002), an approach which encourages markers to award the full range of marks.

Performance and sight singing are both areas in which Music 2 students seemed to easily excel, hence the non-normal distributions mentioned above. However, in composition the distribution indicates that students generally found the task more difficult. It is also likely that students received less extra-curricular tuition in composition. Aural dictation shows the most dramatic differences between both years. Students clearly found the multi-part aural dictation in 2010 more challenging than the single-part aural dictation of 2011. These considerations become important with further analysis procedures.

Correlational analysis of the cohort

For four skill areas, there are six possible pairs for correlational analysis. These pairs are presented for the 2010 and 2011 results. For each pair, the correlation coefficient *r* (Rodgers & Nicewander, 1988) is numerically stated on the following graphs (Figures 5, 6, 7, 8, 9, and 10). The size of each dot indicates the number of students who achieved each combination of marks.

Aural dictation and sight singing skills

For 2010 the correlation was 0.51 and for 2011 the correlation was 0.59 (Figure 5). The 2010 result is indicative of the more difficult aural dictation. Both correlations represent the highest values in this study. This outcome supports the findings of other studies and writings which express a strong relationship between aural dictation and sight singing (Kodály, 1974; Telesco, 1991; Damschroder, 1995; Tacka & Houlahan, 1995;

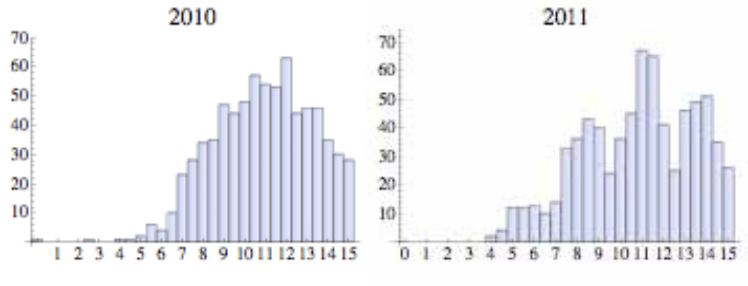


Figure 4: Histogram of 2010 and 2011 HSC composition results.

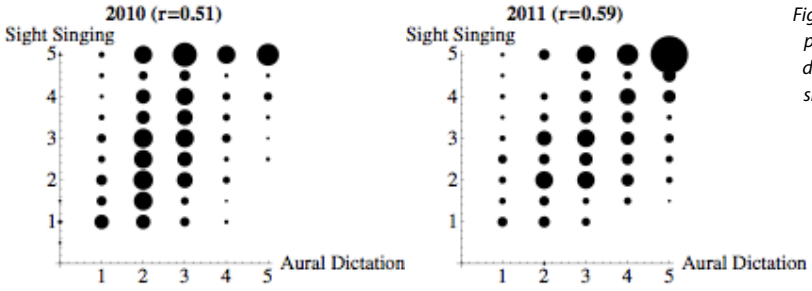


Figure 5: Scatter plots of aural dictation and sight singing.

Gordon, 2004; Sisley, 2008; Cleland & Dobrea-Grindahl, 2010).

Aural dictation and performance skills

For 2010, the correlation was 0.31 and for 2011 it was 0.37 (Figure 6). With no change in requirements for the performance component, the impact of the aural dictation results is emphasised. These lower correlations could result from the obvious differences in the examination pressures for each skill. Students would likely prepare for aural dictation with less intensity than for performance due to the greater weighting given to performance and the unseen aural dictation material.

Aural dictation and composition skills

For 2010, the correlation was 0.26 and for 2011 it was 0.32 (Figure 7). Both correlations represent the lowest values in this study.

While some students may use compositional methods involving aural dictation skills, it is speculated that students use a performance-based compositional approach. As with all other comparisons so far, the 2010 results show a lower correlation, emphasising the influence of the more difficult 2010 aural dictation.

Sight singing and performance

For 2010, the correlation was 0.41 and for 2011 it was 0.38 (Figure 8). These low results could convey the differences between each skill: where sight singing requires a performance environment with unseen material, the performance requires prepared material. Performance is a highly multifaceted skill (Parcutt & McPherson, 2002) and this could also contribute low correlations.

Sight singing and composition

The correlation strength for 2010 was 0.34 and for 2011 was 0.35 (Figure 9). This skill combination

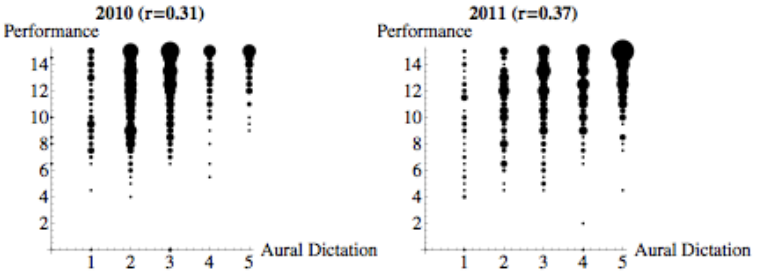


Figure 6: Scatter plots of aural dictation and performance.

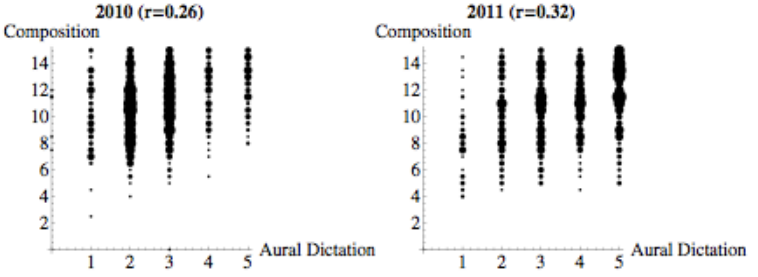


Figure 7: Scatter plots of aural dictation and composition.

demonstrates the most consistency across years. However, these correlation results are too low for conclusions of value.

Performance and composition

The correlation strength for 2010 was 0.36 and for 2011 was 0.43 (Figure 10). For all correlations involving composition, it is with performance that the highest correlation occurs. This data also shows that most students are more competent as performers than they are as composers, likely utilising performance skills for the composition process.

General correlation trends

There are some significant trends that emerge from the correlation values. For each combination of skills there is a reasonable degree of consistency between years. The difference between 2010 and 2011 for any combination was

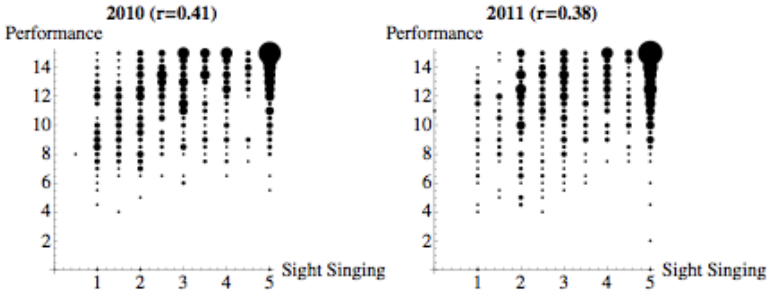


Figure 8: Scatter plots of sight singing and performance.

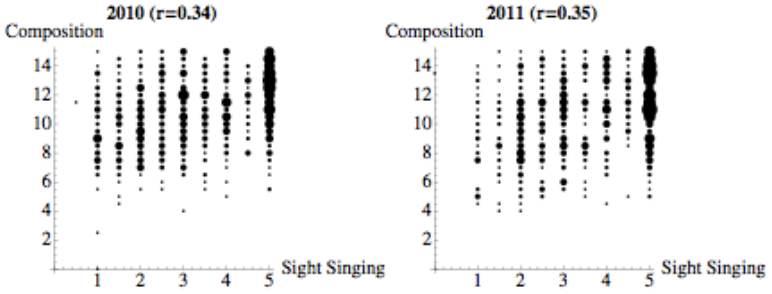


Figure 9: Scatter plots of sight singing and composition.

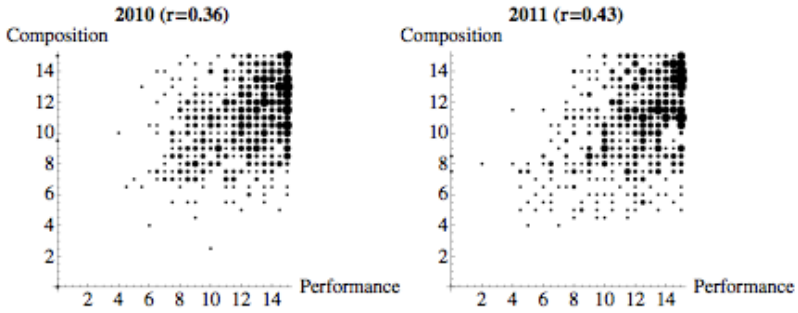


Figure 10: Scatter plots of performance and composition.

never greater than 0.08. There is strength in this consistency and in the large sample sizes. While the correlations may be considered statistically low, in the educational context earlier mentioned, particular notice should be given to the ordering of the correlation values. The results of this study found aural dictation and sight singing with the highest correlations followed closely by performance and composition.

Comparative analysis of top achievers

For each skill, a method was devised to isolate the top achievers. The selected data was then analysed in each comparative area to identify any one skill acting as a predictor of success in others.

Method for isolating top achievers

In order to identify top achievers, the researcher devised separate marking ranges for each skill (Table 1) based on the histograms in Figures 1, 2, 3 and 4. This method ensured that top achievers were identified to accentuate the level of difficulty for each task.

Data Analysis of Top Achievers

While comparison of top achievers was carried out for each of the six skill combinations, only the comparisons that obtained notable results are displayed in graphical form. The top left chart shows top achievers in 2010 for skill *a*, with grey indicating the subset of those who were also top achievers in skill *b*. The chart on the top right shows the converse: the top achievers in skill *b*, with grey indicating the subset of those who were also top achievers in skill a. The lower charts show the same information for 2011.

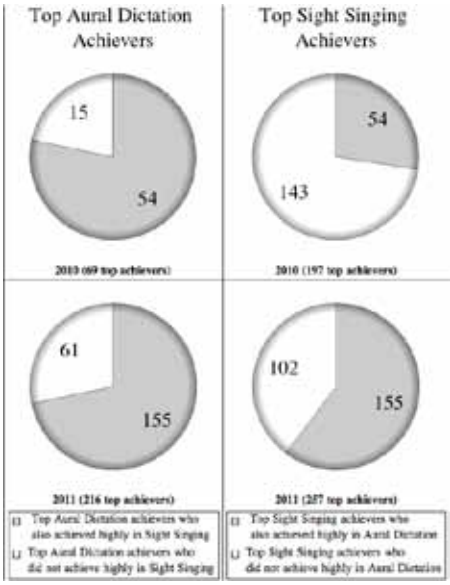
Table 1: Marking ranges chosen for top achievers.

Skill Area	Total Possible Marks	Marking Range for Top Achievers
Aural Dictation	5	5
Sight Singing	5	5
Performance	15	14-15
Composition	15	13-15

Aural dictation and sight singing

Figure 11 compares the results for top aural dictation achievers with top sight singing achievers. In 2010, a large proportion of top aural dictation achievers were also top achievers in sight singing. However only a small proportion of top sight singing achievers were also top achievers in aural dictation. In 2011, a similar trend can be noted, although the difference is less significant. The 2010 top aural dictation achievers were most likely to also be top achievers in sight singing. Thus, achievement in the multi-part aural dictation of 2010 may be a useful predictor of success in sight singing.

Figure 11: Pie charts comparing top achievers for aural dictation and sight singing.



Aural dictation and performance

Figure 12 compares the results for top aural dictation achievers with top performance achievers. In 2010, a large proportion of top aural dictation achievers were also top achievers in performance. However, only a small proportion of top performance achievers were also top achievers in aural dictation. In 2011, there is a small difference between those who achieved in one skill and those who achieved in both skills. The 2010 top aural dictation achievers were most likely to also be top achievers in performance. Thus, achievement in the multi-part aural dictation of 2010 may be a useful predictor of success in performance.

Aural dictation and composition

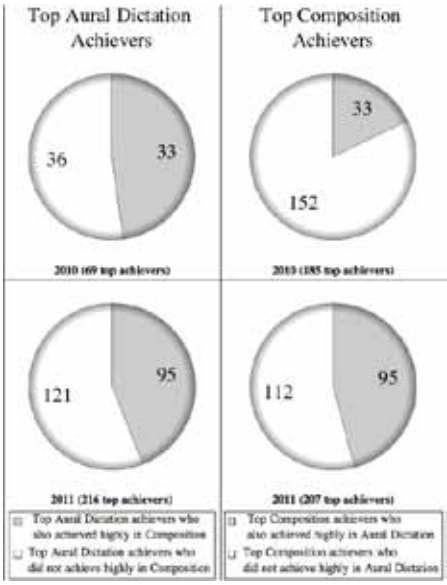
Figure 13 compares the results for top aural dictation achievers with top composition achievers. In 2010, a significant proportion of top aural dictation achievers were also top achievers in sight singing. However, only a small proportion of composition top achievers were also top achievers in aural dictation. In 2011, there is a small difference between those who achieved in one skill and those who achieved in both skills. The 2010 top aural dictation achievers were more likely to also be top achievers in composition. Thus, achievement in the harder aural dictation of 2010 may be a useful predictor of success in composition.

General trends among top achievers

The method of choosing individual marking ranges for each skill area resulted in a fairly consistent number of students for each year in each skill. The only exception was for the 2010 multi-part aural dictation which resulted in significantly fewer top achievers. The multi-part aural dictation question was therefore the most

Figure 12: Pie charts comparing top achievers for aural dictation and performance

Figure 13: Pie charts comparing top achievers for aural dictation and composition



successful skill for isolating top achievers. Further, the 2010 multi-part aural dictation could be used as a predictor of success in sight singing, performance and composition.

Conclusion

The interdisciplinary nature of musical relationships is aptly captured by Gorow (2009, p. 8): "when composing, be the listener; when orchestrating, be the composer; when copying or conducting, be the performer". This study sought to investigate relationships between aural dictation, sight singing, performance and composition. The nature of these relationships was considered through a discussion of relevant literature and quantitative analysis strategies.

An array of literature was explored to consider research that had been conducted on relationships between the focus skills for this study. This investigation drew attention to the multitude of sub-skills which are part of each of the four chosen focus skills. Pedagogical texts conveyed philosophical links between these skills, and many studies investigated the interplay between different musical skills. The literature is substantially made up of qualitative studies or pedagogical texts that indicate an assumed premise that strong relationships exist between aural dictation, sight singing, performance and composition. This study was concerned with addressing these empirically untested assumptions through quantitative analysis.

The data collected from the Australian NSW Music 2 HSC Examinations, in 2010 and 2011, represented the focus skill areas: aural dictation, sight singing, performance and composition. The distribution histograms showed the 2010 multi-part aural dictation question as most difficult. The correlational analysis found aural dictation and sight singing to be the skills most highly correlated, followed by performance and composition. These correlations highlight strong skill relationships which could be endorsed by educators to assist student development.

The most significant point of congruity between the literature and this study was the primary role of aural dictation skills in the development of other musical skills. The comparative analysis of top achievers found that the multi-part aural dictation from 2010 could be used as a predictor of success in sight singing, performance and composition skills. This suggests that developing multi-part aural dictation skills may assist in high achievement of other music skills. This finding is particularly beneficial for music educators as they strive to nurture young musicians. Further, the implications from this study suggest that teachers are likely to notice student improvement in a range of musical skills if they foster multi-part aural dictation skills.

When outlining the characteristics of a good musician, Kodály (1974, p. 197) emphasised the importance of "a well-trained ear". He then went on to express the benefit of a "well-trained intelligence", "a well-trained heart" and finally "a well-trained hand". For the making of a good musician "all four must develop together". Music educators play an important part in nurturing the development of their students into good musicians. The findings of this study demonstrate that the development of multi-part aural dictation skills in particular, make a vital contribution to the overall success of the musician.

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