# Effectiveness of Targeted Feedback towards Rhythm Sightreading in University/College-Level Music Education Contexts

**by**

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B.Mus., University of British Columbia, 2012

Thesis Submitted in Partial Fulfillment of the
Requirements for the Degree of
Master of Arts

in the
Faculty of Education


SIMON FRASER UNIVERSITY
Summer 2017

# Approval

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| **Title:** | **The Effectiveness of Targeted Feedback towards Rhythm Sightreading in University/College-Level Music Education Contexts** |
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# Ethics Statement

The author, whose name appears on the title page of this work, has obtained, for the research described in this work, either:

a. human research ethics approval from the Simon Fraser University Office of Research Ethics

or

b. advance approval of the animal care protocol from the University Animal Care Committee of Simon Fraser University

or has conducted the research

c. as a co-investigator, collaborator, or research assistant in a research project approved in advance.

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## Abstract

Achieving fluency in sightreading—particularly rhythm reading—is often cited by researchers as a universally problematic aspect of formal music education. Music teachers and students also widely recognize sightreading as a challenge to learn. A review of the literature revealed that sightreading ability is typically assumed by educators to develop naturally in students through the accumulation of experience in general musicianship, rather than given attention as a stand-alone component of instruction in formal music curricula. Overall, there is not an immediately clear answer as to what kind of practice or instruction can help improve sightreading most effectively. This study employed a simple experimental design to compare rhythm sightreading pre- and posttest errors between a group that practiced rhythm sightreading daily for one week, and a treatment group in which participants practiced daily and received expert feedback. Findings showed that the treatment group had statistically significant rhythm sightreading performance improvement over the course of the study, while the practice-only group did not.



**Keywords**: sightreading; sight-reading; music education; college music programs; university music programs

## Dedication

I dedicate my Thesis to all who have supported me in my Master's program, including my thesis supervisor, committee, course instructors, friends and family. Without all of you, I could not have come this far. Thank you.

## Acknowledgements

I would like to say a big thank you to Dr. Kevin O'Neill. I have been very fortunate to have your expert guidance throughout my entire thesis process! I would also like to thank Dr. David Kaufman and Dr. Michael Ling for being such supportive committee members. Finally, I would like to thank Dr. Shawn Bullock, Dr. John Nesbit, Dr. Michael Ling, Dr. David Kaufman, Dr. Engida Gebre, Dr. Alyssa Wise, Dr. Oslem Sensoy, and Dr. Susan O'Neill for everything I have learned from you and for your valuable advice, for which I am extremely grateful! It has been an absolute pleasure to work with all of you throughout my Master's program.

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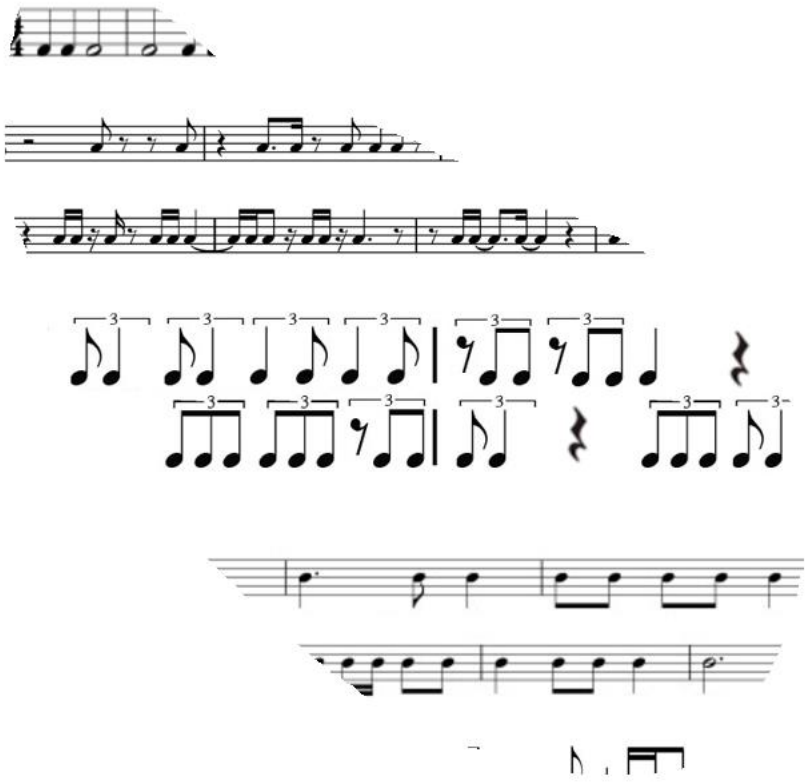
# List of Acronyms

| | |
|---|---|
| EAF | E-Assessment Feedback |

## Glossary

| | |
|---|---|
| Sightread (or sight-read) | Read and perform (music) from sheet music, without preparation. |
| | (Oxford English Dictionary) |

## Introductory Image



# Chapter 1.

# Introduction

Having been a university music major before becoming a piano, percussion, music theory and composition instructor for more than a decade, I am deeply aware of the many technical challenges faced by music students in western music education. One of the most important ones is the skill of *sightreading* or *sightsinging*. To explain, the terms *sightread* and *sightsing* refer to the acts of reading music that is completely or relatively new to a musician—that he/she has little or no previous experience with—from notation, and then immediately performing it (either on an instrument, or singing in the case of a vocalist). While musicians in general sometimes learn new music aurally or "by ear" (which means listening to a performance and mimicking it), sightreading is a requirement in formal music education settings, such as university music programs. Aside from being a requirement, it is also an extremely useful skill as these students move into their professional careers (for instance, recording studio session musicians).

In my undergraduate music career, I recall constantly being intimidated by the task of sightreading even though it was such an integral part of my music curriculum and I dealt with it almost on a daily basis in ensemble classes or private music lessons with my instructors, in addition to sightreading tests. Since there was no instruction on the matter, independent practice was the only option. After years of practice and effort, I recognized some noticeable improvements, such as greater rhythmic accuracy, but they came extremely slowly and I still struggled with some rather rudimentary rhythmic patterns on a "bad" day. I realized the main issue was not knowing how to practice sightreading effectively and there was no expert guidance. In essence, I was unaware of my sightreading weaknesses. The typical general recommendation circulating among us, music students, was simply "Grab a music score, a guitar book, or any sheet music, and just try your best to play that melody or rhythm on your own instrument!" The feeling of inadequacy was exacerbated by fear of embarrassment when I was to sightread in the presence of other musicians.

After becoming a music instructor, what I have observed in my years of teaching is a lack of clear, research-informed instructional guidelines to help students learn to

sightread or sightsing music well. Much anecdotal evidence from colleagues in the field resonates with this. It is still common practice to tell students to work on sightreading in their own time, and teachers only typically point out sightreading errors (for example, an incorrectly sightread rhythmic pattern) if and when they hear them by chance during a private lesson or ensemble session, rather than allocating a fixed amount of regular lesson time to the subject.

In alignment with my own experience, achieving fluency in sightreading is also often cited by researchers as a universally problematic aspect of formal music education (Elliott, 1982; Gudmundsdottir, 2010), and this assessment is corroborated by fellow music instructors. Fourie (2004) states that sightreading ability typically develops as a "by-product of performance study" (p. 17) and is often assumed by educators to develop naturally through the accumulation of experience in general musicianship. For this reason, it is not given much attention as a stand-alone component in formal music curricula.

Research has shown the matter to be more complex. A number of scholars have suggested that there are numerous factors at play in developing sightreading skill, concerning both technical aspects in music and general cognitive aspects (Kopiez & Lee, 2008; Waters, Townsend, & Underwood, 1998; Zhukov, Viney, Riddle, Teniswood-Harvey, & Fujimura, 2014). However, extant research does not suggest an immediately clear answer as to what kind of practice or instruction can help improve sightreading most effectively (Gudmundsdottir, 2010).

The lack of research-based guidance on the matter of sightreading remains a significant issue – particularly for music students in formal university or college music education programs, where the ability to sightread is pivotal. Sightreading is expected in key learning contexts, such as individual music lessons and ensembles, as well as sightreading examinations. Such examinations include both: a) the reading of musical passages incorporating pitch and rhythm, and b) purely rhythm-based tests with no pitch content (hence the heightened importance of rhythm reading).

Accordingly, the purpose of the study at the heart of this thesis was to test my hypothesis that having instructors provide college music majors with specific, individualized feedback could yield more measurable benefits for students' rhythm

sightreading skill than solo practice by itself. In order to test this hypothesis, I developed an experiment in which volunteer students were randomly assigned either to a practice-only group that practiced rhythm sightreading on a daily basis for one week, or a group that not only practiced rhythm sightreading but also received personalized feedback after each day of practice. Since it is impractical to have music instructors provide full sightreading lessons for each individual student due to cost (and this is the most probable reason why no stand-alone sightreading instruction is offered as a part of standard curriculums in music programs), an alternative of having instructors devote a small amount of time to each student seems to be much more feasible. The goal of my study was to test the efficacy of an approach to sightreading practice (involving feedback given to students) that would be practical to either integrate directly in college- or university-level music programs or could be provided as a supplement to them, in order to better support the sightreading skill building that my students (and myself as a former music student) have difficulty with.

The following Chapter will provide a review of literature relevant to the development of rhythm sightreading skill, and explain how this literature informed the framing and design of the study. Chapter 3 will detail the design of the experiment and the data collection and analysis procedures. Chapter 4 will describe the findings of the study. Finally, Chapter 5 will provide some perspective on the study findings by explaining its implications and limitations.

# Chapter 2.

# Review of Literature

## 2.1. Rhythm and Pitch

From a musical-technical standpoint, the process of sightreading entails two core elements: rhythm reading and pitch reading. Although both are essential components contributing to the overall fluency of reading music, literature in the field has provided evidence that they are dissociated skills which can be targeted separately in instruction (Bengtsson & Ullen, 2006; Mishra, 2015; Schon & Besson, 2002). For instance, Fourie (2004) notes that being able to effectively create memory structures or maps that support sightreading of new music depends on exercising the dimensions of rhythm reading and pitch reading separately. These authors support the proposition that pitch and rhythm reading require separate practice.

Further, between the two components of pitch and rhythm, there is substantial empirical research evidence that rhythm reading is the predominant issue in musicians' overall sightreading ability, and that challenges with rhythm reading greatly outweigh pitch reading problems (Fourie, 2004; McPherson, 1994; Mishra, 2015). Gudmundsdottir (2010) notes that reading music successfully relies significantly on ability to decode rhythm patterns, and McPherson (1994) indicates that improvement in ability to "grasp rhythm figures" (p. 218) can result in an improved ability to read music. Similarly, Gromko (2004) found in her study of wind instrumentalists that one predictor of sightreading performance was the ability to perceive rhythmic patterns. These findings are in alignment with my own experience in my years of teaching, as well as with experiences shared by colleagues in the field.

Some fairly large-scale research studies have supported the value of rhythmic awareness to musicians' sightreading performance. For instance, Killian and Henry (2005) examined 198 singers' sightsinging performances to assess the extent to which a number of their adopted sightsinging strategies impacted performance. It was revealed that having awareness of rhythmic factors throughout the music (e.g., steady tempo)

was significantly beneficial, and that using body movements to maintain the beat or pulse appeared to be a successful strategy. In alignment with this, Henry's (2011) study involving sightsingers suggested that rhythmic success is likely to be a good predictor of pitch accuracy. However, the opposite was not found to be necessarily true – pitch reading performance did not appear to affect rhythm-reading performance. In addition, Penttinen and Huovinen's (2011) study confirmed that less-experienced sightreaders tended to neglect rhythmic aspects while sightreading. Finally, Fourie (2004) and Zhukov et al. (2014), in providing an overview of previous literature, both highlighted rhythm errors as a predominant issue in sightreading that demanded educators' and musicians' attention.

These findings appear to point to the implication that a focus on rhythm training could benefit overall sightreading performance. Researchers such as Hayward and Gromko (2009) have provided suggestions for building a strong sense of rhythm in sightreading, including exercises of clapping or tapping rhythmic patterns during sightreading. However, these exercises still point students in a direction of general practice without revealing specific areas where they should focus.

## 2.2. Perception of Musical Structure/Pattern Recognition

Though the findings of prior research on sightreading are too general to prescribe a specific practice routine for improving sightreading, a subset of the surveyed literature concerning how sightreaders and sightsingers perceive musical patterns yields some recommendations for improving rhythm reading. Since there is limited time to scan the music score as a student sightreads, he/she must move along quickly and make sensible decisions in allocating attention to specific parts of the score. In exploring what a sightreader should focus on in order to ensure both accuracy and speed, a number of studies have suggested that the ability to recognize larger units or chunks of music, such as phrases and rhythm groups, is beneficial to sightreading performance, as opposed to taking in one or two individual notes or rhythmic units at a time (which is considered inefficient sightreading).

For example, Goolsby's (1994) frequently-cited study using the eye movement tracking methodology confirms the benefit of directing attention to multiple areas of the music score and making an effort to maximize the information acquired with each look at

the score (which is found to characterize stronger sightreaders), rather than fixating on specific spots or single notes for too long. A similar and more up-to-date study by Penttinen and Huovinen (2011) had results consistent with Goolsby's (1994) findings. In both studies, identifying musical notation in chunks rather than in individual notes benefitted sightreading proficiency. This strategy was also noted by Fourie (2004).

Overall, prior research offers some important insights into how identifying structure in music influences sightreading fluency. In the context of rhythm sightreading, one commonly recommended sightreading approach is spending a small amount of time to visually delineate rhythmic patterns before beginning to sightread. Specific strategies include mentally breaking down the entire passage into chunks, such as rhythmic phrases or groupings (Lehmann, Slobada, & Woody, 2007; Kopiez & Lee, 2008; Kostka, 2000; Wristen, 2005). These authors establish the importance of the ability to recognize rhythmic patterns quickly.

## The Need for Specific, Individualized Guidance in Practice

It is important to note that all of these strategies offered in the literature share an important limitation: They only concern how to handle actual sightreading situations *immediately before they are about to happen*, rather than how to practice the skill itself. Further, despite establishing the importance of identifying rhythm patterns, the studies offer no clear suggestions as to which rhythm patterns should be practiced, and whether or how to choose specific patterns to target (which depends largely on the individual sightreader).

To make matters worse, very limited (and ambiguous) sightreading instruction is offered in formal music education programs. As Kostka (2000) notes, general instructional methods for sightreading typically include clapping rhythms while counting the underlying beat, singing the musical passage, visually identifying melodic and rhythmic patterns before playing. The general lack of sightreading guidance remains an issue for music students in formal university or college music education programs, because simply practicing sightreading regularly on their own does not guarantee improvement (Zhukov, 2014).

Based on the literature surveyed, and since to my knowledge there is little to no curriculum specifically devoted to developing the skill of sightreading in formal music education, it is reasonable to assume that music students may face challenges in the course of their own practice due to the lack of professional guidance from experts such as their instructors. This may be especially true with regard to rhythm practice, which has been established as the more problematic side of sightreading (over pitch).

Specifically, rhythm sightreading proficiency in practical learning contexts (such as an ensemble rehearsal or sightreading examination) demands familiarity with the many permutations of rhythmic patterns constructed by different note values or durations and their corresponding *rests* (durations of tacitness). Specific problems faced by students may include finding difficulty in performing self-assessment and diagnosing rhythmic patterns that they are weak at, or resorting to starting from the beginning of a musical passage once they make an error, rather than making practice efficient by targeting and working on only the problematic rhythm units.

With the lack of formal instructional guidance specifically devoted in current music programs to improving individual students' rhythm sightreading ability, I began to consider the possibilities of offering a feedback component to aid each student in improving this ability. This prompted me to research the general role of feedback in learning.

## Research on Feedback in Learning

Hattie and Timperley (2007) define the term "feedback" as "information provided by an agent (e.g., teacher, peer, book, parent, self, or experience) regarding aspects of one's performance or understanding" (p. 81). Literature on feedback in the broad domain of learning is extensive. It has long been established that providing learners with feedback on their performance can play a valuable role in promoting learning and improving task performance (Bandura, 1991; Black & Wiliam, 1998; Hattie & Timperley, 2007; Langer, 2011). Granted, there are a number of authors who have used contradictory results and evidence to counter-argue that feedback may not be linked to performance benefits, that it may even be detrimental in certain circumstances (Evans, 2013; Hattie & Timperley, 2007; Kluger & DeNisi, 1996; Langer, 2011), and that the variability of its effectiveness cannot be explained (Kluger & DeNisi, 1996). Authors have

further noted that the success of feedback is dependent on multiple factors, such as the nature of the feedback, how it is given, learner needs and task purposes, etc. (Hattie & Timperley, 2007; Poulos & Mahony, 2008).

Nevertheless, effective feedback is widely acknowledged to be a useful and integral component of effective learning environments (Black & Wiliam, 1998; Hattie & Timperley, 2007; Kluger & DeNisi, 1996; Langer, 2011; Slavin, 2012). In fact, research has shown that feedback is becoming increasingly important in instructional and learning strategies (Evans, 2013). Ferguson (2011) notes that the essential benefit of feedback is that it encourages learners to become self-reflective and self-regulated, not only in school settings but also as they become professionals.

Unfortunately, the research cited above has taken place in a wide array of contexts such as language learning and retention of content knowledge, and there remains a paucity of research on how successful principles of feedback can be applied across various fields and areas of learning (Crossouard & Pryor, 2009)—such as music performance, in particular. Therefore, in cases that are not covered by these principles, trial and error could eventually be the only option for learners and teachers, despite a wealth of general recommendations on how feedback should be provided in a broad sense (Langer, 2011). In alignment with this, unfortunately and perhaps unsurprisingly, there appears to be no literature specifically on providing feedback for music sightreading practice and learning purposes.

In my literature review process, I became familiar with Evan's (2013) explication of *e-assessment feedback* (EAF). In principle, EAF could be provided via television, interactive media, or the Internet (Evans, 2013). Many scholars have noted benefits of this form of feedback, such as better self-regulation (Evans, 2013), learner engagement (DeNisi & Kluger, 2000) and strong retention of learning (Evans, 2013). In addition, this form of feedback delivery emerged as a viable option for my study due to its flexibility. Participants in my study did not have time to take part in some of the practice activities in person due to physical distance and time pressures such as preparation for examinations. For this reason, EAF (either in the form of interactive media or the Internet) was a highly fitting arrangement since it allowed for feedback on participants' sightreading performance to be delivered not only regularly but also in a way that was easily accessible. Finally, as the sole provider of sightreading performance feedback, I

was required to attend to 28 participants. This would have been extremely difficult to coordinate if the feedback was administered in person.

In integrating the feedback component into the overall design of the study, I took into account a number of recommendations and principles for implementing effective feedback noted in the literature, where applicable to my case. First, scholars have noted that feedback should be given in a timely manner for successful retention, and in a way that gives the learner an opportunity to react to or act on it (Carless, Salter, Yang, & Lam, 2011; Van Merrienboer, Clarke, & De Crook, 2002). Accordingly in my study, feedback was provided by the end of each day of the study, and on the next day learners were required to re-perform previous tasks based on the most recent feedback received (see details in the following Chapter).

The second principle is that feedback should be task or performance related, and should refrain from including personal elements (Hattie & Timperley, 2007; Kluger & DeNisi, 1996) or making comparisons between the performance of the learner and others (Evans, 2013). This principle was implemented in my study by ensuring a neutral, respectful tone in delivery the feedback, making sure no personal comments were made, and not making comparisons between learners (see details in the following Chapter).

The third and final principle is that the best kind of feedback offers clear, explicit instructions on what should be done to enhance task performance, and provides learners with opportunities to experience successful exemplars, models and demonstrations (Carless et al., 2011; Evans, 2013; Evans & Waring, 2011). To reflect this recommendation in my study, feedback given to learners contained clear explanations on how to improve performance by pointing out exactly where task errors occurred and the nature of these errors, accompanied by correct demonstrations of these tasks (see details in the next Chapter).

## Research Direction and Questions

Based on the above research, I began to believe that it was likely beneficial to provide music students with specific, individualized and professional feedback on the rhythmic patterns that they were weakest at recognizing as they carried out sightreading practice. Accordingly, my proposed research sought to answer the following questions:

1) Is there a measurable benefit to university/college-level music students' rhythm sightreading performance when specific feedback is provided on the types of rhythmic patterns they should practice?

2) What common rhythmic patterns and combinations present the greatest sightreading challenges for university/college-level music students?

With reference to Question 1, it is important to operationalize the term "feedback" in this music education (and specifically, sightreading) context. For the purposes of this research, I will use the term "rhythm feedback" to refer to a music instructor listening to an individual student's sightreading performance of a rhythmic passage and pointing out which specific rhythmic units (for example, a *sixteenth*- or *eighth-note* combination unit) the student is struggling to perform accurately. Ideally, feedback should also include a demonstration of how to correctly perform the rhythmic unit, so that the student can use this example to guide their own practice.

This research aims to explore the possible benefit of incorporating rhythm-based sightreading instruction and feedback in current university/college-level music education curricula.

# Chapter 3.

# Methods

## 3.1. Methodology and Overview of Research Design

The main purpose of this thesis was to establish an evidence base for a practical pedagogical approach to help music students improve sightreading achievement in true-to-life learning settings such as sightreading examinations, private instrumental lessons and ensemble rehearsal settings. In addition, this will also benefit working musicians, as sightreading is an essential component in professional contexts from recording a popular song as a studio session musician to rehearsing with an orchestra.

In terms of research perspective and paradigm, since the primary emphasis was specific measurable sightreading performance, a positivistic empirical methodology was appropriate (Tymms, 2012; Waring, 2012). In order to test the hypothesis that offering specific, individualized feedback on what rhythms to practice can benefit students' rhythm sightreading performance, this research study primarily used a quantitative approach.

An experiment was conducted for a period of one full school week (5 days). 28 college music students who volunteered for the study were randomly assigned to one of two groups: a *practice-only group* or a *feedback group*. The treatments provided for each group will be discussed further below.

Before the experiment began, both groups completed a rhythm sightreading pretest comprised of a short rhythmic excerpt, created in consultation with other experienced music instructors to optimize the difficulty level. Students' performance on the pretest was rated based on a simple count of errors. This pretest not only helped ensure that participants in both groups had relatively equal starting points in terms of their rhythm sightreading skill, but also served as a sightreading performance baseline which could be compared to the posttest later on. The pretest was accompanied by a questionnaire (see Appendix 1), which asked students about their musical backgrounds and their self-efficacy with regard to sightreading.

During the next 5 days of the experiment, participants in both groups submitted audio recordings of their individual rhythm sightreading practice on a daily basis. For this practice, participants used sheet music which I once again created in consultation with experienced music instructors. Students who had been randomly assigned to the practice group received daily acknowledgements that they had submitted their recordings, but no feedback on their actual performance.

For subjects in the feedback group, I listened to each recording and responded by the end of the same day with specific feedback on their errors, referring to exact bar numbers on the sheet music and time marks in the audio files they submitted. In addition, I provided a correct demonstration of every rhythmic pattern they had committed errors on, by sending an audio recording back to them. When a participant received feedback, he/she was required to correctly perform the rhythmic pattern again at the beginning of the next recording. In order to avoid bias and ensure the quality of feedback given to the feedback group, I enlisted the help of an experienced colleague when listening to the participants' recordings and providing feedback.

At the end of the 5-day practice period, a rhythm sightreading posttest (similar to the pretest) was conducted, and individual students' performance was again evaluated through a simple count of the number of errors. Accompanying the posttest was a second questionnaire (see Appendix 2) which included questions on any self-perceived improvement and rhythmic patterns participants still found troublesome after the 5 days of practice. Full details of the study are provided below.

## 3.2. Detailed Methods

### 3.2.1. Recruitment and Informed Consent

After the Simon Fraser University Office of Research Ethics issued approval for my study, I contacted music department coordinators and instructors at all colleges in the Lower Mainland of British Columbia that operated music programs, and obtained permission for recruitment of participants. I also obtained research ethics approvals at each college. With instructors' permission, I attended music classes to speak directly with music students about this study, and offered an incentive for participation (an entry in a cash prize draw). Students were given assurance that they could withdraw from the

study at any of point without any consequences whatsoever, and that they would still be entered in the prize draw nonetheless. In order to ensure random assignment to the two treatment conditions of practice only or practice plus feedback, each participant randomly picked an ID number from 1 to 28 from a jar. Numbers 1 to 14 were assigned to the practice group, and 15 to 28 became the feedback group.

Initially, a total of 49 students from various colleges signed the consent form for participation. There were 14 students who did not respond to later e-mail messages, and 7 students began participating in the study, but had to be excluded from the analyses reported below because they failed to submit all of their sightreading practice recordings for the 5-day period. Ultimately, 28 participants completed all the required tasks for the study.

### 3.2.2. Sampling Participants

In all, 28 participants (16 male, 12 female) fulfilled all the required activities of the study, by submitting all 5 rhythm sightreading practice recordings, as well as completing the two questionnaires, the pretest and the posttest. They were evenly distributed across the two treatment groups, with 14 in the practice group and 14 in the feedback group. No participant was given information about the hypothesis underlying the experiment until the end of data collection. To preserve anonymity and avoid bias (when audio recordings were evaluated for errors by my colleague and myself), participants were not required to provide names but simply used their participant ID numbers when submitting their audio recordings.

### 3.2.3. Sightreading Practice Methods and Experiment Instruments

#### *Sightreading Sheet Music and Practice Methods*

For each of the 5 days of the experiment, participants were each given one page of sheet music to work with. Each page contained 5 rhythmic passages that were different from the other days' passages. In other words, there were 25 different passages in total to be sightread. The types of rhythmic patterns used involved combinations of half notes, quarter notes, eighth notes, sixteenth notes, eighth-note triplets and rests that corresponded to these note types. There were no other types of

notes, such as thirty-second notes or sixteenth-note triplets. In terms of time signature, the rhythmic passages were limited to 2/4, 3/4, 4/4, and 6/8.

The rationale for these design choices with regard to the sightreading tasks was that other note types, even though present at times, are not as commonly used in the music repertoire at this level, as determined through consultation with a few colleagues. A balanced level of difficulty was achieved by arranging these note types both in a relatively downbeat-driven manner (this means that notes are placed mostly on downbeats or quarter-note beats of the bar, which are considered more straightforward and predictable beats, making sightreading the rhythm relatively easy) as well as in a relatively syncopated manner (note placement tends to lean towards upbeats or off-beats, which are typically less expected, providing more challenge to the sightreader) throughout all the passages. Below is an example of a piece of sheet music for one of the days.

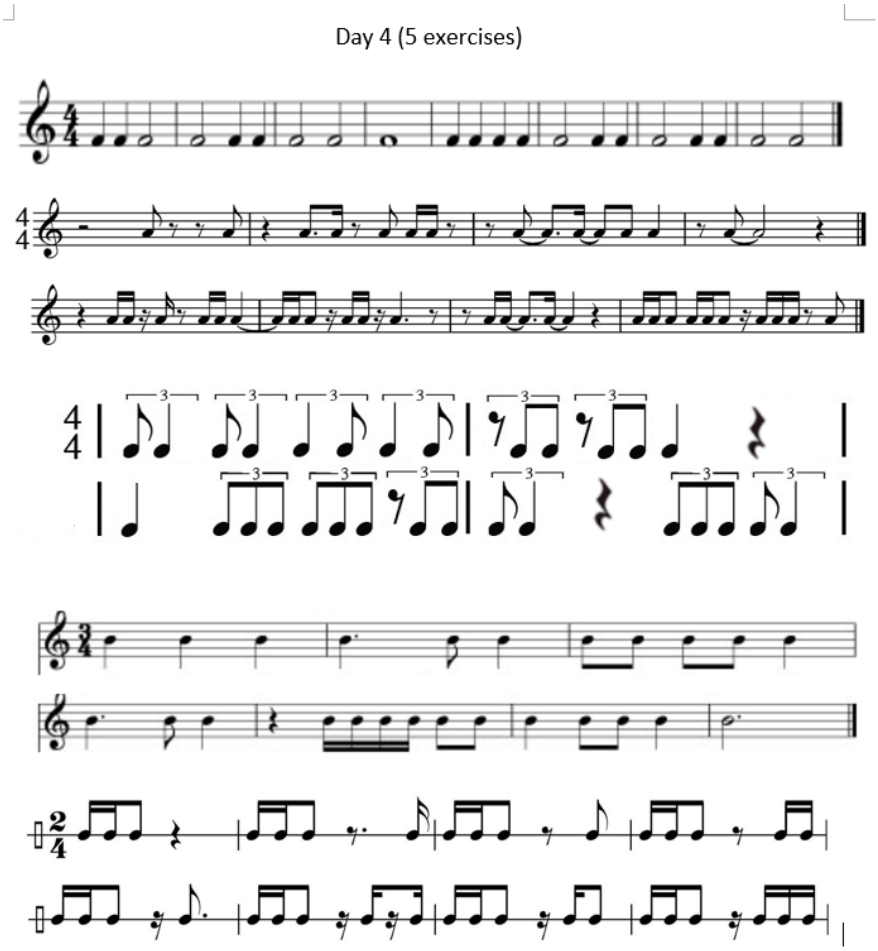



**Figure 1 Example of sheet music (day 4)**

For the recorded sightreading practice sessions, participants were given the options of clapping, tapping, singing, or playing on an instrument when performing the daily rhythms. One might argue that singing and playing a rhythm on an instrument are different from clapping and tapping, because the former methods allow for sustain of a note (that is, the sound can be held) while the latter two do not. However, since the type of sightreading evaluation in this study is only concerned with the performer's timing of articulating a note—the initial attack—there is no difference between these four methods as articulation is carried out in exactly the same way across all of them.

### *Recording Devices and Audio File Submission*

To record their daily rhythmic passages, participants were given the freedom to choose any device they preferred. Most of them used a cellphone, while some used laptop computers. There were no issues with the quality or clarity of any of the recordings submitted by the participants, as they all chose to record in a quiet environment with minimal background noise.

Participants submitted their audio files to me by e-mail. The recordings were typically between 3 and 10 minutes each in length. (Participants were told they could move on to the next passage once they felt satisfied with their attempt of the current one, or repeat it as they wished, so long as the entire recording was no longer than 10 minutes.) The file sizes were fairly small, typically between 2 to 8 megabytes, so there were no technical issues with submission via e-mail attachment. For the feedback group, I also sent my personalized feedback in the form of audio files to participants by e-mail.

## 3.2.4. Procedure

### *Questionnaire 1*

Immediately following the signing of the consent form, participants were given a brief questionnaire consisting of 7 questions (see Appendix 1). Questions 1, 2, 4, 5 and 6 in the questionnaire asked for participants' music education history and usual sightreading practice habits, which could provide relevant data to pave way for future follow-up research of a similar focus.

The third question—the questionnaire's main question—asked for participants to report their confidence in their own ability to clap or tap out the sample rhythmic passage provided. (This passage was deemed by several college music instructors to be of average and appropriate difficulty) This question would enable the participants' responses to be compared later to their actual sightreading pretest performance to provide context. The final question asked participants to report rhythmic patterns that they typically struggled with.

### *Pretest*

After finishing questionnaire 1, the participants completed a rhythm sightreading pretest (see Appendix 3), which consisted of two rhythmic passages containing quarter-, eighth- and sixteenth-note combinations—the note types that were appropriate for the purposes of this study. This pretest was of similar difficulty to the passage found in questionnaire 1, consisting of the same types of notes.

For convenience, the pretest took place in person after participants came forward to take part in the study. They took turns meeting with me privately, one at a time, in a separate space away from others, where I showed each of them the pretest sheet music and had them attempt to sightread it, giving them 10 seconds to prepare before beginning (as is generally considered reasonable for a short passage). The pretest took between 1 and 2 minutes on average. I silently counted the number of errors as each participant sightread the passage, and recorded the error count only after he/she left. This was done in order to avoid making the task feel like a strict test, and to minimize any anxiety that the participant might have experienced in association with the task.

This pretest served two purposes: 1) to assess whether participants in both groups had relatively equal starting points with respect to their skill for rhythm sightreading; 2) to serve as a sightreading performance baseline which could be compared to the subsequent posttest to demonstrate any improvement. After the day of the pretest, participants started creating their daily sightreading recordings.

### *Daily Sightreading Recordings*

On each day of the 5-day experiment, participants in both groups opened a digital version of a piece of sheet music (clearly labeled and designed for that day), attempted all the rhythmic passages in the method of their choice (clap, tap, sing or play), recorded the process and submitted the audio file to me by e-mail using their study ID number. Participants were told not to sightread more than 1 page of sheet music or submit more than 1 recording per day. Participants followed this rule consistently. Some participants spoke and gave cues during their recordings so that I could easily track which passage they were attempting when I listened to them. These

cues included, for instance, “Okay, now I’m moving on to the next passage.” Even though a number of them simply sightread rhythms without speaking, I faced no difficulty in following them from start to finish as they attempted all rhythmic passages. Throughout the 5-day period, I sent participants daily e-mails to remind them to continue with their sightreading recordings until they completed all 5.

For participants in the feedback group, I responded by the end of each day with specific, individually tailored feedback on each participant’s errors, explaining where the errors were and what the issue was (e.g., eighth notes were too rushed and sounded like triplets). For accuracy and for participants’ convenience, I referred to exact page and bar numbers in the sheet music, and the time marks in the audio files they submitted when describing errors. In addition, I provided a correct demonstration of each problematic rhythmic pattern by sending an audio recording back to them, in which I tapped out the rhythms and counted out loudly as I went along. An experienced colleague was on hand for all feedback I provided to give a second opinion, as well as to prevent oversights and ensure accuracy. When a participant received feedback, he/she was required to correctly perform the rhythmic pattern again at the beginning of the next day’s recording before moving on to new ones.

As noted earlier, participants in the practice group were not given any feedback but only acknowledgement of their submissions on a daily basis.

### *Questionnaire 2*

Questionnaire 2 (see below), containing 4 questions, was given out to participants by e-mail after they completed all the 5-day sightreading passages. The first question, using a 5-point scale, was intended to help me gain an understanding of participants’ self-perceived awareness of their improvement in sightreading, as it was suspected that the feedback group would note more significant improvement than the practice group. The response data could also potentially be related to statistical findings based on participants’ actual sightreading posttest scores.

The third and fourth questions were related to research question 2 of the study, which pertained to the types of rhythmic patterns students experienced difficulty with (so

that future music instruction could potentially target them). The fourth question was also intended to provide a clearer picture on whether the feedback component benefitted certain rhythm types more than others, although this issue was largely beyond the scope of this study and mostly intended to pave the way for further research. The purpose of the second question was simply to help me understand whether participants found such a practice routine acceptable, and their attitude towards it.

### *Posttest*

I conducted the posttest with each participant over the phone rather than in person. This was the choice of the vast majority of the participants for reasons of convenience. In order to ensure that participants did not have too much time to study the rhythms in advance before they made their attempts (which would defeat the purpose of sightreading as this would not gauge their true ability to read music unfamiliar to them), I did not send them the posttest sheet music by e-mail until we started the phone conversation and they were ready to begin sightreading.

The type of sightreading material in the posttest (see Appendix 4) was similar to that in the pretest in terms of difficulty level and length. Similar to the pretest, the posttest took between 1 and 2 minutes for each participant on average. Once again, I silently counted the number of errors made by each participant as he/she sightread the passages, and tallied the errors at the end without notifying them of their scores.

## 3.2.5. Data Collection and Analysis Procedures

### *Data Collection Procedure*

After receiving participants' daily audio recordings sent to me by e-mail, I then organized, labeled them by participant ID numbers and stored them in two folders—practice group and feedback group—on my computer.

Data in the form of students' responses from rating-scale-based questions in the questionnaires (questions 3 and 5 in questionnaire 1, and question 1 in questionnaire 2) were manually tallied and recorded in the SPSS data analysis software. As for the pretest and posttest, students' rhythm sightreading performance errors of any form—note length, note omission, additional notes and incorrect rhythm—were noted, tallied and also recorded in SPSS for statistical analysis.

### *Data Analysis Procedure*

Data analysis began with tests for normality and equivalence of variance, which were performed in order to determine whether parametric or non-parametric statistical tests were appropriate for hypothesis testing (since parametric tests require normal distribution of data as an underlying assumption).

With the assumption of normal distribution satisfied, an independent-sample t-test on the rhythm sightreading pretest errors was conducted between the two participant groups to check for equivalence at the beginning of the study. Once this was completed and it was found that both groups had an equal starting point, I moved on to a paired-sample t-test for each group to determine the significance of overall changes in sightreading error counts from their pretest to posttest performances. Next, an independent-sample t-test was also performed using data from questionnaire 1 to confirm that participants in both groups had an equal baseline level of self-perceived rhythm sightreading ability at the start of the study. Finally, another independent-sample t-test was performed using data from questionnaire 2 to identify any significant differences between the two groups in terms of self-perceived improvement in rhythm sightreading throughout the study.

Detailed procedures of the analyses and the results can be found in the following Chapter.

# Chapter 4.

# Results

## 4.1. Research Question 1: Is there a measurable benefit to university/college-level music students' rhythm sightreading performance when specific feedback is provided on the types of rhythmic patterns they should practice?

Descriptive statistics were first carried out in SPSS including histograms and frequency tables. Scores for both groups (practice and feedback) were analyzed for normality and equality of variance to determine if parametric (e.g., t-test) or non-parametric tests (e.g., Mann-Whitney U-test or the Kolmogorov-Smirnov two-sample test, etc.) were suitable to make comparisons between the two groups. Skewness and kurtosis z-scores (Cramer & Howitt, 2004; Doane & Seward, 2011) and the Shapiro-Wilk test ($p>0.05$) (Shapiro & Wilk, 1965) confirmed that the distributions of the number of pretest and posttest errors in each group were normally distributed.

Figure 2 below shows the pretest histograms for both groups. For the practice group, the skewness z-score was 0.592/0.597=0.9916; the kurtosis z-score was 1.977/1.154=1.7132. For the feedback group, the skewness z-score was -0.10/0.597=-0.1675; the kurtosis z-score was -0.212/1.154=-0.1837. All z-score values were less than +/- 1.96, which helped me to conclude that there was some skewness and kurtosis for both the practice group and the feedback group, but no significant deviation from normality. Also, the Shapiro-Wilk test significance levels were 0.259 and 0.890 for the two groups respectively ($p>0.05$ for both). Therefore, data were considered normally distributed.

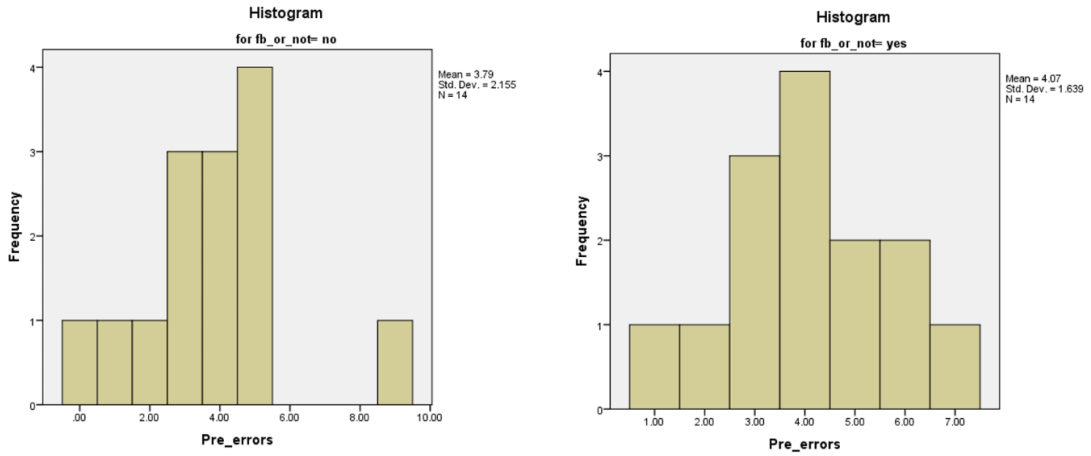



**Figure 2 Pretest histograms**

For the posttest (Fig. 3 below) the practice group's skewness z-score was 0.703/0.597=1.1176; the kurtosis z-score was -0.225/1.154=-0.1950. The feedback group's skewness z-score was 0.332/0.597=0.5561; the kurtosis z-score was -1.023/1.154=-0.8865. Again, all z-score values were less than +/- 1.96, indicating that there was no significant deviation from normality. The Shapiro-Wilk test also confirmed this with a significance level of 0.264 and 0.150, both of which were above 0.05.

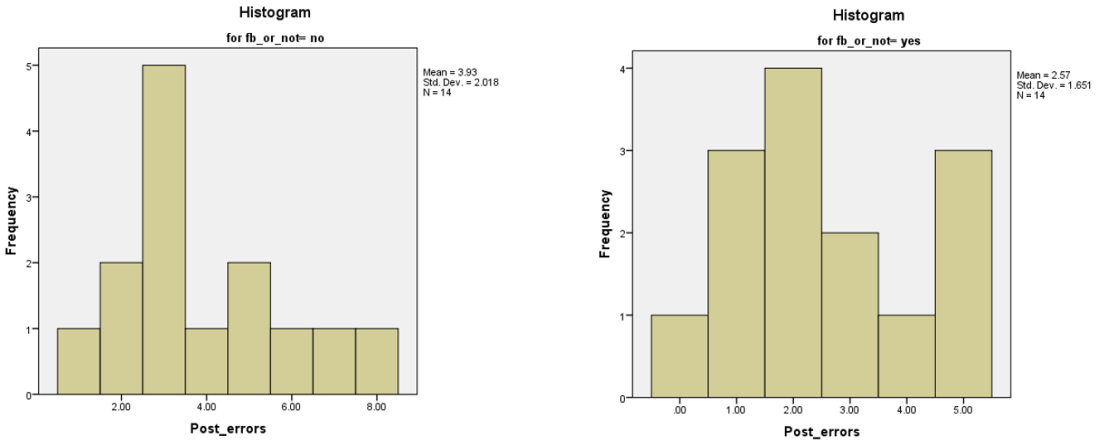



**Figure 3 Posttest histograms**

Next, Levene's test of homogeneity of variance was used to ensure equality of variances for the two groups. For the pre-treatment errors variable, Levene's Test of Homogeneity of Variances yielded a significance level of 0.539, indicating equality of variance between the two groups ($p>0.05$) (Martin & Bridgmon, 2012). For the post-treatment errors variable, Levene's Test showed a significance level of 0.479, indicating equality of variance between the two groups on this variable as well.

### 4.1.1. Comparison of Pre-Treatment Errors

Since the data were normally distributed, t-tests could be used to compare the two treatment groups. The first tests were used to confirm that the two groups had similar competence at rhythm sightreading at the beginning of the study. As is shown in Table 1 below, the mean number of pre-test errors did not differ significantly between the two groups. Further, the independent-samples t-test shown in Table 2 also did not reflect any statistically significant differences in means or variances.

**Table 1 The 2 groups' error count means**

**Group Statistics**

| | fb_or_not | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pre_errors | no | 14 | 3.7857 | 2.15473 | .57588 |
| | yes | 14 | 4.0714 | 1.63915 | .43808 |

**Table 2 Independent-sample t-test for pretest**

**Independent Samples Test**

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 95% Confidence Interval of the Difference | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Pre_errors | Equal variances assumed | .387 | .539 | -.395 | 26 | .696 | -.28571 | .72357 | -1.77303 | 1.20160 |
| | Equal variances not assumed | | | -.395 | 24.271 | .696 | -.28571 | .72357 | -1.77820 | 1.20677 |

As shown above, the mean error counts for the pretests of the two groups did not differ significantly. Since the two groups began with comparable sightreading

performance, differences that might emerge between them over the course of the study could be safely attributed to the treatments provided in the study.

### 4.1.2. Pretest-to-Posttest Changes

Next, paired-sample t-tests were conducted for both groups in order to detect pretest-to-posttest changes in sightreading errors.

**Table 3 Change in error count mean of practice group**

**Paired Samples Statistics**

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | Pre_errors | 3.7857 | 14 | 2.15473 | .57588 |
| | Post_errors | 3.9286 | 14 | 2.01778 | .53927 |

**Table 4 Error count change t-test for practice group**

**Paired Samples Test**

| | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference Lower | Upper | | | |
| Pair 1 | Pre_errors - Post_errors | -.14286 | 1.83375 | .49009 | -1.20163 | .91592 | -.291 | 13 | .775 |

**Table 5 Change in error count mean of feedback group**

**Paired Samples Statistics**

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | Pre_errors | 4.0714 | 14 | 1.63915 | .43808 |
| | Post_errors | 2.5714 | 14 | 1.65084 | .44121 |

**Table 6 Error count change t-test for feedback group**

**Paired Samples Test**

| | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 95% Confidence Interval of the Difference | | | | |
| | | Mean | Std. Deviation | Std. Error Mean | Lower | Upper | | | |
| Pair 1 | Pre_errors - Post_errors | 1.50000 | .75955 | .20300 | 1.06145 | 1.93855 | 7.389 | 13 | .000 |

As Tables 3 and 4 above indicate, the practice group's error count increased slightly from the pretest to the posttest, from 3.79 to 3.93, though the change did not reach statistical significance. On the other hand, as Tables 5 and 6 indicate, the feedback group's error count decreased from the pretest to the posttest, from 4.07 to 2.57, and this change was highly significant.

Therefore, the answer to the main research question of whether feedback supports improvement in rhythm sightreading is yes. Based on the changes in error rate over the course of the study, we may conclude that providing specific, individualized and professional feedback indeed helps students to improve their rhythm sightreading performance.

### 4.1.3. Questionnaire 1 (Administered at Pretest)

The intention of having participants complete questionnaire 1 was to provide contextual information about their musical background, experience, and self-perceived sightreading ability.

How confident are you that you could clap/tap out the following passage accurately? Please circle.

1- I would surely make a mistake(s)
2- I am likely to make a mistake(s)
3- I may or may not make a mistake(s)
4- I am unlikely to make a mistake(s)
5- I would surely not make a mistake(s)

**Figure 4 Question 3 in Questionnaire 1**

The quantitative question in questionnaire 1 (Figure 4 above) uses a 5-point-scale. A short sample rhythm sightreading passage was provided, and all participants rated how confidently they were in their ability to sightread it accurately.

Again, note that the difficulty level of this passage was determined through consultation with a few experienced music instructors. Option 1 meant the least confident and option 5 the most. In the end, 14 out of 28 participants chose the middle option—"I may or may not make a mistake(s)". Only 4 participants chose option 2; 6 chose option 4; 4 chose option 5; no participants chose option 1. This also confirmed an appropriate difficulty level for the sample passage, in alignment with the music instructors' consultation.

**Table 7** **Sightreading confidence level mean of each group**

**Group Statistics**

| | fb_or_not | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Qn1_confidence | no | 14 | 3.5000 | 1.01905 | .27235 |
| | yes | 14 | 3.2143 | .80178 | .21429 |

**Table 8** **Independent samples t-test comparing confidence level means of the two groups**

**Independent Samples Test**

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 95% Confidence Interval of the Difference | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Qn1_confidence | Equal variances assumed | 1.921 | .177 | .824 | 26 | .417 | .28571 | .34655 | -.42662 | .99805 |
| | Equal variances not assumed | | | .824 | 24.636 | .418 | .28571 | .34655 | -.42855 | .99997 |

Next, a t-test was performed on the confidence levels of the participants in the two groups (whether they could sightread the passage accurately). The results (Table 8 above) showed that at the beginning of the study there was no statistically significant difference between the average ratings provided by the two groups. This suggests that

the baseline skill level was relatively uniform across the two treatment groups. These data further supported findings from the independent t-test (discussed earlier) that indicated equality between the groups in their pretest sightreading performance.

### 4.1.4. Questionnaire 2 (Administered at Posttest)

The purpose of questionnaire 2 was intended to help me understand how beneficial participants perceived the sightreading practice supported by the study to be.

**Compared to the beginning of the study, how would you rate your rhythm sightreading ability now (please circle):**

1- Much worse than before
2- Somewhat worse than before
3- No change
4- Somewhat better than before
5- Much better than before

**Figure 5 – Question 1 (quantitative) in Questionnaire 2**

This 5-point-scale question in questionnaire 2 asked participants to report any self-perceived improvement from participating in the study and experiencing the daily sightreading exercises. Overall, 13 out of 28 participants in the study only chose option 3—"No change"; 14 chose option 4—" Somewhat better than before"; and only 1 chose option 5—"Much better than before". In the feedback group, option 4 was the most frequently chosen one (9 out of 14 participants) while only 5 participants in the practice group chose it.

**Table 9** **Self-perceived improvement means of the two groups**

**Group Statistics**

| | fb_or_not | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Self_p_imp | no | 14 | 3.3571 | .49725 | .13289 |
| | yes | 14 | 3.7857 | .57893 | .15473 |

**Table 10** **Independent-sample t-test comparing self-perceived improvement between the two groups**

**Independent Samples Test**

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 95% Confidence Interval of the Difference | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Self_p_imp | Equal variances assumed | .011 | .919 | -2.101 | 26 | .045 | -.42857 | .20396 | -.84783 | -.00932 |
| | Equal variances not assumed | | | -2.101 | 25.421 | .046 | -.42857 | .20396 | -.84829 | -.00885 |

A t-test (Table 10 above) indicated that there was a statistically significant difference (p=0.045) between the two groups in terms of whether they felt they had improved in their rhythm sightreading ability throughout the experiment. Again, even though any improvement in sightreading performance here was self reported, it nevertheless served as evidence that the group which received specific, individualized feedback had greater awareness of improvement than the practice-only group.

In addition, in my observation, a few themes emerged from the participants' answers to some open-ended questions in questionnaire 2. Overall, participants in both groups expressed appreciation for the regimen of recording their sightreading practice sessions, as it provided an opportunity to isolate and focus specifically on the element of rhythm, which they did not take the opportunity to do otherwise. One participant from the practice group stated, "I don't have a method to practice rhythm regularly. It does not seem to be a priority, especially for (classical) voice. I also studied conservatory guitar years ago and there was no real rhythm training there either." This participant also suggested that such a way to practice rhythm sightreading would be a "good study program to develop." Another participant from the feedback group noted, "This was wonderful because I usually don't practice rhythm for class." Another one from the

practice group mentioned, “It’s better to record like in this study compared to what I normally do as it forced me to practice and work on the rhythms I’m horrible at”. From these data, I conclude that the majority of participants found having such a regimen beneficial.

However, I observed that that participants from the feedback group also mentioned noticing tangible benefits from the feedback they received, aside from merely completing the assigned exercises. For instance, one participant noted, “This [feedback] is the kind of thing that gives me a second opinion/different perspective, especially coming from a pro, which I would never be able to come up on my own through any kind of self-evaluation.” In another case, a participant initially struggled with an eighth-note triplet rhythmic unit in one of the exercises. Based on the specific way she was sightreading that rhythmic unit, I gave her some feedback and suggested she try repeating that pattern a few times in a certain way. When she made her next recording, she easily recognized an identical pattern and said in the recording, “This looks familiar. Oh, wait, I remember re-doing this exact triplet thing a few times from yesterday, so I’ll get it right this time for sure.” Then she succeeded in performing that pattern accurately on her first attempt. It is reasonable to say this revealed that the feedback component played a role in helping sightreaders discern different rhythmic patterns. It also aided them in promoting awareness of their own ability to tackle them and allowed them to direct their attention and practice time to the rhythms that needed the most work. Such comments were not brought up by the practice group, as those participants did not receive feedback.

## 4.2. Research Question 2: What common rhythmic patterns and combinations present the greatest sightreading challenges for university/college-level music students?

**Table 11** **Detailed table of error types made by the two groups**

### Practice group

**Post_error_8th**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | 1.00 | 4 | 28.6 | 100.0 | 100.0 |
| Missing | System | 10 | 71.4 | | |
| Total | | 14 | 100.0 | | |

**Post_error_16th**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | 1.00 | 6 | 42.9 | 60.0 | 60.0 |
| | 2.00 | 3 | 21.4 | 30.0 | 90.0 |
| | 3.00 | 1 | 7.1 | 10.0 | 100.0 |
| | Total | 10 | 71.4 | 100.0 | |
| Missing | System | 4 | 28.6 | | |
| Total | | 14 | 100.0 | | |

**Post_error_triplet**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | 1.00 | 3 | 21.4 | 37.5 | 37.5 |
| | 2.00 | 4 | 28.6 | 50.0 | 87.5 |
| | 3.00 | 1 | 7.1 | 12.5 | 100.0 |
| | Total | 8 | 57.1 | 100.0 | |
| Missing | System | 6 | 42.9 | | |
| Total | | 14 | 100.0 | | |

**Post_error_rest**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | 1.00 | 4 | 28.6 | 50.0 | 50.0 |
| | 2.00 | 4 | 28.6 | 50.0 | 100.0 |
| | Total | 8 | 57.1 | 100.0 | |
| Missing | System | 6 | 42.9 | | |
| Total | | 14 | 100.0 | | |

### Feedback group

**Post_error_8th**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | 1.00 | 1 | 7.1 | 100.0 | 100.0 |
| Missing | System | 13 | 92.9 | | |
| Total | | 14 | 100.0 | | |

**Post_error_16th**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | 1.00 | 6 | 42.9 | 54.5 | 54.5 |
| | 2.00 | 4 | 28.6 | 36.4 | 90.9 |
| | 3.00 | 1 | 7.1 | 9.1 | 100.0 |
| | Total | 11 | 78.6 | 100.0 | |
| Missing | System | 3 | 21.4 | | |
| Total | | 14 | 100.0 | | |

**Post_error_triplet**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | 1.00 | 4 | 28.6 | 66.7 | 66.7 |
| | 2.00 | 1 | 7.1 | 16.7 | 83.3 |
| | 3.00 | 1 | 7.1 | 16.7 | 100.0 |
| | Total | 6 | 42.9 | 100.0 | |
| Missing | System | 8 | 57.1 | | |
| Total | | 14 | 100.0 | | |

**Post_error_rest**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | 1.00 | 6 | 42.9 | 85.7 | 85.7 |
| | 2.00 | 1 | 7.1 | 14.3 | 100.0 |
| | Total | 7 | 50.0 | 100.0 | |
| Missing | System | 7 | 50.0 | | |
| Total | | 14 | 100.0 | | |

Table 11 above shows details of the types of rhythm errors (eighth notes, sixteenth notes or sixteenth-note combinations, eight-note-triplets and rests) made by participants in both groups in the rhythm sightreading posttest. The grey column shows number of errors (1, 2 or 3 etc.) and the frequency column shows how many participants made such a number of errors. For instance, concerning sixteenth-note type errors in the practice group (left side of table, under "post_error_16$^{th}$"), 6 participants made 1 such error; 3 participants made such 2 errors; and 1 participant made such 3 errors. In total, there were 32 sixteenth-note errors, 23 triplet errors, 20 rest errors and 5 eighth-note errors made by all the participants together. There were no quarter-note or half-note errors. Thus, students had the most difficulty with sixteenth-note rhythm patterns (possibly due to the relatively large number of permutations and groupings of this category of rhythmic patterns), which future instructional interventions could target. Triplets and rests also proved to be troublesome for students.

# Chapter 5.

# Discussion

## 5.1. Implications

Literature in the field of music education has demonstrated that sightreading (particularly rhythm sightreading) is rarely given attention as a stand-alone domain for instruction. This can create problems for music students, since there is often a lack of specific guidance on what sightreading material to practice and how to practice it. This typically leads to inefficient independent practice, since students are often not the best judges of their own sightreading strengths and weaknesses. Thus, the issue that needs to be addressed is that students require expert guidance that caters to their individual sightreading characteristics. It must also be considered that having instructors devote precious lesson or class time to each individual student to monitor their sightreading progress is impractical and cost inefficient, which begs for an alternative solution.

This study demonstrates the positive potential of a type of practice arrangement for rhythm sightreading in which music instructors allocate a short amount of time to each student, who is given the opportunity to receive expert feedback that is specifically tailored according to their own sightreading strengths and weaknesses, learn from instructors' correct demonstrations, and then act upon this feedback to benefit the development of their skill.

Certainly, it would be unsurprising to some readers that some participants found even a fixed practice regimen (without feedback) to be somewhat beneficial compared to their self-imposed practice routines, which were typically less routine. However, what might still be surprising is that over a short period of just one week, students receiving feedback delivered entirely online improved in their sightreading performance more than students who practiced regularly but without feedback.

More substantially, the study showed that simple and readily-available technology can be used to deliver customized feedback that meets the specific needs of individual learners. The study therefore provides an existence proof that addresses the

important issues of cost, convenience and practicality. It seems entirely feasible to replicate this intervention in many music education settings, especially when such an arrangement is not generally adopted in current university and college music programs. It is hoped this study's findings could not only motivate music students and instructors, but administrators and other stakeholders of such programs.

This study contributes to the field of sightreading and music education by addressing the lack of research on the role of feedback (especially delivered electronically, or EAF) towards sightreading, and thus filling a research gap. The results of this research suggest that expert feedback may be an essential component in supporting the improvement of learners' rhythm sightreading ability, producing measurable results as opposed to merely carrying out independent practice. This study reinforced Zhukov's (2014) contention that practice alone may not yield tangible positive learning outcomes. The findings of the study also imply that there may be untapped potential in more fully utilizing readily-available technology in music education.

In educational terms, it is also significant that students in the feedback group achieved a performance improvement from an average of 4.07 errors to 2.57 errors on a rhythm sightreading test over a span of just 5 days. This is not only a statistically significant change, but a change that would surprise some music educators given the small amount of time invested on the part of both the participants and the instructor.

## 5.2. Limitations and Other Considerations

Of course, the findings of the study must be viewed in the context of other conditions and factors that might have influenced the results. First, the study's sample size of n=28 was small. Even though I had reached out to all colleges in the BC Lower Mainland area that had music departments when recruiting participants, response was limited. This may have been due to the small incentive for participation (as the study was funded by myself). Nevertheless, sampling was done randomly from across various colleges' music programs in lieu of conveniently from existing music classes or groups. Further, participants were randomly assigned to the two groups and there were no detectable baseline differences that could have contributed to the results.

It must be noted that since participants were not isolated in a lab environment without external influences, it is possible that not all of the measured improvement in their sightreading ability is attributable to the feedback component. Possibly, other factors impacted their sightreading ability during the course of the data collection. However, my colleagues and I agreed that other daily activities that students may have taken part in, even if music related (such as listening to music or playing in a band), typically do not give students an opportunity to focus specifically and intensively on rhythm sightreading—using sheet music, as this study did. Therefore, such experiences likely had minimal impact on the outcomes of the study.

Since the study used volunteer participants, as opposed to general music students mandated to take part in the rhythm sightreading practice activities, it is uncertain how the findings might have differed with students who were differently motivated. This is an inevitable issue found in most research, due to the simple fact that potential subjects cannot be forced to participate for ethical reasons.

Participants also varied in the number of years they had been studying music formally. This might be taken as indication that students did not have equal skills as the study began. However, the length of music study does not necessarily correlate with sightreading ability, as shown by the baseline sightreading pretest which indicated similar levels of performance between the two groups. Therefore, this does not appear to be a reason for doubting the results of the study.

Some readers might be concerned that the participants used a variety of modalities/methods to sightread, including tapping, clapping, singing and playing on an instrument. However, upon consultation with a few music instructors, it was concluded that this was unlikely to have affected participants' sightreading performance since none of their sightreading attempts were made at such a fast tempo that one modality would introduce a physical advantage or disadvantage over others.

Another possible flaw of the study design is that time on task was not rigorously controlled across the two groups. It is possible that the feedback group practiced more than the practice-only group, possibly going beyond merely completing the daily sightreading exercises, as the feedback might have encouraged or inspired them. At the very least, the requirement for the feedback group to begin each daily recording by

repeating the passages from the previous day in which they had committed errors meant that they practiced somewhat longer than the practice-only group. Uncertainty surrounding the impact of time on task must be understood in interpreting the results of the study.

Further, though most participants submitted their audio recordings on a day-to-day basis over 5 days, not all participants did. A few participants would, at times, forget to record their practice sessions for a day or two, and only submitted the recording a day or two later, despite e-mail reminders. This means that my feedback was not always attended to immediately. Even though my feedback was given in the form of an audio file that participants could listen to immediately before they created their delayed recordings days later, I had no control over whether they actually did so, or relied on a possibly flawed memory of my feedback from days before. Nonetheless, based on my records none of the participants delayed any of their recordings for more than 2 days. It was therefore safe to conclude that the 5 daily exercises were done fairly consecutively without much time gap between. With a larger number of participants, it might have been possible to gauge a difference between the sightreading performance of the participants who delayed their submissions versus those who were always on time. Though this was not feasible for the present study, it would be a useful focus for future research.

Another limitation of this study is that despite demonstrating measurable improvement in rhythm sightreading performance over a period of one week, it does not indicate an optimal period of time for training of such a nature to be carried out. If college music program stakeholders or administrators consider incorporating this approach into their programs, it is more than likely that they would be interested in knowing how long to implement it for. The key factor to consider here is students' rate of improvement. How many weeks or months are required for ideal results? Will there be a point at which diminishing returns, or even a plateau in performance is observed as feedback sessions carry on? The present study was not designed to address such questions, but perhaps future research could study and clarify these issues.

Finally, the design of the study and its instructional approach did not consider incorporating qualitative elements to inform and support the intervention's design. From an instructional design perspective, it could have been advantageous to conduct a needs assessment with students prior to the study itself—possibly in the form of

interviews or a performance assessment. Additional insights could have been gleaned from such interviews. For instance, students could have suggested a hybrid approach that blended online and in-person feedback elements, which would have been different from the arrangements of this study. Such steps could have been taken in order to better understand learner needs and produce a more holistic, well-rounded study design that is better grounded in such needs.

## 5.3. Areas of Future Research

First of all, as mentioned in the limitations section above, some participants did not submit their audio recordings over the 5 consecutive days of the experiment, which meant there was some delay involved. Further research in future could examine performance differences between those who submit their recordings consistently on time and those who delay their submissions. With more substantial research funding, there can be better incentives for participants and therefore possibly a greater chance to ensure they submit recordings on time. Also, future experiments could be set up in a way that allows for equal time on task (amount of time spent during each sightreading practice and recording session) in both control and treatment groups and across all participants, which was not feasible to monitor closely in the scope of this study. Future studies could also address the important issue of the ideal period of implementing sightreading feedback (i.e. whether there is a point of plateau or diminishing returns as interventions continue), as also noted in the limitations section.

In addition, scholars have noted that feedback is only a building block in the grand scheme of learning (Lew, Alwis, & Schmidt, 2010). There is research evidence that combining effective instruction and feedback can yield even great success than relying on feedback alone (Hattie & Timperley, 2007). Since this study has foregrounded that feedback can help to address the lack of expert guidance for sightreading and the lack of measurable benefits from students' independent practice in current higher music education settings, one possible question future research could investigate into is whether some kind of classroom instruction can be administered in conjunction with feedback to produce further advantages. Of course, the added component of instruction could imply greater costs, but positive results may justify such costs.

Finally, the positive findings of the study also imply that there may be potential in adopting more technology use in music education (and specifically sightreading) to enhance instructional or practice efficiency and effectiveness. (This could also be coupled with the feedback component) Even though the use of technology in education is frequently researched, this area of focus is lacking in the domain of music education (and specifically sightreading) literature. As potential extensions to this study, possible realms to explore include incorporating video feedback (as opposed to audio only) in music practice or instruction, the advantage of which is that it affords students visual cues, so that they may be able to pick up more performance nuances from expert demonstrations. Another possible topic is how different problematic rhythmic patterns—especially the ones identified in this study—can be taught or practiced most effectively (and perhaps research results will show that they should be handled in different ways).

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# Appendix A – Questionnaire 1

Main instrument(s)/Voice:_____

How long have you studied music formally? _____

How confident are you that you could clap/tap out the following passage accurately? Please circle.

1- I would surely make a mistake(s)
2- I am likely to make a mistake(s)
3- I may or may not make a mistake(s)
4- I am unlikely to make a mistake(s)
5- I would surely not make a mistake(s)

What method(s) do you normally use to practice rhythm sightreading? (or regular sightreading, which includes pitch) Please circle all that apply.

1- Play on an instrument 2-Sing 3-Clap/tap 4-Others:

How regularly do you practice rhythm sightreading? (or regular sightreading)

1- I usually don't
2- Fewer than 5 times a month
3- Once per week
4- A few times per week
5- Once per day
6- More than once per day

How long is each practice session? (in minutes or hours)_____

What rhythmic patterns do you struggle the most with when sightreading? E.g., sixteenth notes, a combination of sixteenth and eighth notes, rests, etc. Or please notate patterns below.

# Appendix B – Questionnaire 2

## Rhythm Sightreading Study Questionnaire 2

**Compared to the beginning of the study, how would you rate your rhythm sightreading ability now (please circle):**

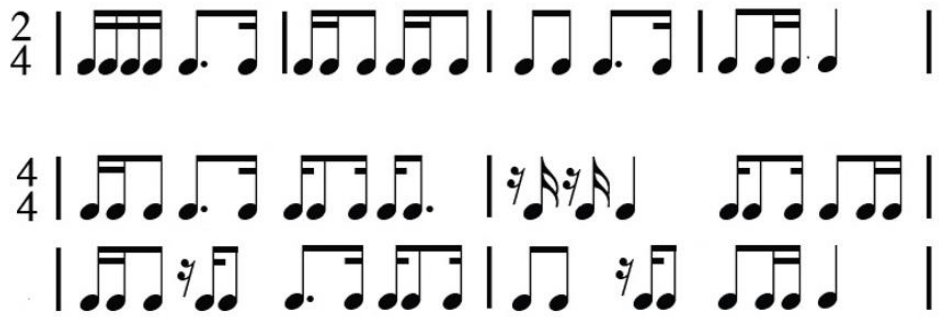
1- Much worse than before
2- Somewhat worse than before
3- No change
4- Somewhat better than before
5- Much better than before

**How does the practice routine used during the study compare with the practice you would normally do on your own?**

**Can you identify rhythmic patterns, if any, that you still struggle with? Please list or notate patterns below.**

**Please list or notate below any rhythmic patterns that you found problematic before but feel you have improved on over the course of the study.**

## Appendix C – Pretest



## Appendix D – Posttest