VOCAL SIGHT-READING ACHIEVEMENT USING TECHNOLOGICAL TOOLS

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Abstract

A mixed-methods action research study was conducted to identify pedagogical approaches used to increase vocal sight-reading achievement. Individual assessments were analyzed to identify gaps in rhythm and pitch accuracy to then inform and modify instructional practices to increase the likelihood of achievement as an ensemble. Student perception regarding technological challenges that emerged during assessments was measured using pretest and posttest surveys for any significant effects. Results showed that the process of individual assessments was beneficial to group instructional practices, as students demonstrated improvement on the posttest evaluation on more challenging material.

Keywords: vocal, sight-reading, choir, assessment, achievement

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Vocal Sight-Reading Achievement Using Technological Tools

This study explored how the use of technology tools can be utilized to inform pedagogical approaches to increase the achievement during vocal sight-reading. A 6A Texas high school choir program used the *Music Prodigy* application to individually assess note and rhythm accuracy of sight-reading prompts. Research-driven curricular approaches were employed during rehearsals over the duration of the study. Data gathered from the individual sight-reading assessments was studied to identify learning gaps. Using this data as guide, group instruction was modified to target the gaps revealed with rhythm and pitch challenges.

Need for the Project

Sight-reading is a skill that requires consistent practice, and to increase musical literacy, necessitates a sequential set of strategies delivered through group instruction as well as self-directed practice. In some choral programs, students are only tested on their ability to sight-read in a group setting, enabling struggling readers to participate without addressing their specific rhythmic or pitch challenges; difficulties that could be identified during an individual assessment. One common method for individual assessment is listening to the student, either in the moment or on a recording, thereby providing data for the evaluator to process for rhythmic and pitch accuracy.

Mastery of the independent skills of rhythm and pitch are essential to success as a sight-reader. Rhythmic reading is a leading indicator to pitch accuracy, with a direct relationship between the ability to count the rhythm and then potentially sing the correct pitch. If the rhythmic value is sung incorrectly, the pitch is often missed (Henry, 2011). More advanced readers should also demonstrate proficiency with markings other than rhythm and pitch. Studies indicate that vocal sight-reading should be tested with additional musical elements, such as

dynamic or articulation markings (Henry, 2011). Rehearsal planning should include specific strategies to add multiple layers of complexity for students at varying levels of development, including tasks devoted to rhythmic development, aural training, and phrasing and musicality during an actual sight-reading exercise. A Henry (1999) dissertation included a researcher-developed measurement instrument used to assess discrete pitch patterns, an analysis of group instructional methods, and a reference sheet that quantified skips and leaps within implied chord structures.

Several studies have addressed group and individual assessment strategies in the choral setting. A Kotora (2001) survey of assessment practices in Ohio high school choral classrooms revealed a shift away from attitude or participation based grading to more formal assessments. A similar study by McClung (1996) indicated grading was based on factors such as participation, attitude, and attendance rather than measurement of skills, such as sight-reading. Kotora also examined the challenges during the evaluation of large choir classes without losing control of the classroom.

Recently, technology advances have aided in the individual music performance assessment process, through use of programs such as *SmartMusic* and *Music Prodigy*. Such tools act as “red note/green note” programs measuring the accuracy of rhythm and pitch. These individual assessment tools provide a resource through which data may be gathered using through the recording and real-time scoring, visible to the student in real time and to the instructor in the forms of reports. One such study used the data obtained from a *SmartMusic* administered trial to disaggregate data of a large group of students into different sub-populations, a process used to modify instructional approaches (Henry, 2014). In another study of band

students, *SmartMusic* was used as a teaching and assessment tool as a means to verify the efficacy of a peer-assisted learning practices (Buck, 2008).

Research was conducted to determine instructional best practices and objectives which help prepare students for success on various levels of sight-reading assessment. Use of technology assessment tools was employed with students to test group instruction efficacy, as well as to inform individual student achievement. Strategies utilized during the study period focused on developing a repeatable, time-efficient protocol ensuring success in group and individual sight-singing trials. Prior training, behavioral and technological factors were considered while measuring outcomes following individual sight-reading trials.

Purpose and Essential Questions

The purpose of this study was to research how sight-reading achievement can be increased with strategic instructional practices prior to the assessment. This project was informed by the following questions:

1. What does the research suggest with regards to pedagogical approaches to classroom instruction to increase vocal sight-reading achievement?
2. Does the individual assessment of vocal sight-reading increase the likelihood of achievement as an ensemble?
3. Do technological challenges that emerge during assessments have a significant effect on the individual sight-reading process?

Review of Literature

Any conducted study should be informed by recent research on the topic from various sources. Using research-oriented databases to develop a list of relevant journal articles, theses, dissertations, and print materials available, several keywords were used, including variants of vocal, choral, sight reading, assessment, individual, and group practices. Common themes emerged from the available research, including assessment practices in the choral classroom, organizational influences on large group sight-reading assessment, individual sight-reading assessments and methods, specific tasks prioritized during individual sight-reading assessments, and the use of technology-based assessment tools. A number of the research studies conducted fit into multiple categories, as the practice of individual sight-reading is informed in many cases by group instruction through the course of ensemble rehearsal.

Assessment Practices in the Choral Classroom

Assessment in music education is one component of a continuous process used to evaluate an individual or the collective ensemble. The methodologies utilized to evaluate student achievement include group assessments at formal contests, informal assessments within the classroom, and recorded or performed individual assessments. Several studies have explored practices of assessment and grading policies in choral classrooms, soliciting responses from students, teachers, and administrators. Research studies and dissertations were selected to gain a national perspective of practices and attitudes with regard to assessment strategies and their utilization in the choral classroom.

McClung (1996) conducted a quantitative study to describe the learning assessment and grading practices of high school choir programs. Three survey groups, including high school choir members, teachers, and principals were used to provide data on a broad range of questions

relating to how grades were determined and how individual assessments were objectively measured. Each survey was constructed using a six category Likert scale. Student responses, drawn from members of the Georgia Senior High All-State Chorus, *N*=615, indicated grading was based on factors such as participation, attitude, and attendance rather than measurement of skills, such as sight-reading. Over half of the student responses indicated that participation and attitude grades comprised six-weeks grades in choir. Nearly 400 students responded that mostly none or some of their grade was based on performance tests, covering music sung in class or as an individual sight-reading prompt. Data supported the suitability of individual sight-reading tests and tests of prepared music to assess the music learning process. Surveys were provided to teachers and principals of the students selected to the All-State Chorus, which posed questions about curricular outcomes and the suitability for specific individual assessments in choral classrooms. Teachers and principals surveyed were in agreement that assessments of learning were necessary beyond the actual demands of performances, including support for tests measuring performance based tasks. However, a similar number of principals supported the use of attitude and participation as measures of student grades in choral classrooms. Students, teachers, and administrators supported the suitability of performance based tasks or sight-reading tests as components of grading policy, although a significantly higher percentage of teachers and principals were in agreement than students.

Kotora (2001) conducted a quantitative study derived from his research of past assessment strategies in both general education and music education. Two hundred and forty-six Ohio choral music teachers returned surveys about the assessment practices in their high school choral programs. Thirty-eight Ohio college choral methods instructors were surveyed about the practices of their pre-service instruction as it related to how they guided development of

assessments. The *Choral Teacher Survey* contained six areas of questions, including requests for general demographic information, usage of twelve distinct assessment strategies, a rating of the usefulness of current assessment strategies, familiarity with National Standards for Music, attitudes about and the frustrations of conducting music assessment, and how well their undergraduate choral methods classes prepared them for the assessment process. The *Choral Methods Teacher Survey* also contained six areas of questions, including requests for general demographic information, indication of inclusion of the twelve assessment strategies in the methods course, a similar ranking of the usefulness of the strategies, indication of the familiarity with and encouragement of the National Standards for Music during their methods instruction, questions about attitudes toward assessment and the frustrations associated with the process of assessment, and questions about how effective their methods instruction prepared pre-service teachers to use assessments in their choral classrooms. Data indicated that concert performances, student participation, and student attendance were the most utilized assessment strategies by the high school directors, each with over 83% of respondents using these strategies as a personal choice rather than a school district, State of Ohio, or National Standards for Music requirement. Singing tests, audiotape recordings, video recordings, and individual performances were also listed as highly utilized as personal choices for assessments. In written comments, directors indicated that lack of time to develop comprehensive assessment strategies and large class sizes were barriers to documenting individual student achievement. The study makes a case for the usage of broader measures of assessment strategies, including testing individuals on skill-based measures, although the practice of assessment is principally derived from group performances, attendance, and participation.

A similar quantitative study conducted by Tracy (2002) asked 183 Southern Division MENC choral directors about issues and practices of individual student assessment in the high school choral setting, investigating the methods and tools used to assess what their students know and can do, as well as how directors utilized the collected data. The survey instrument posed questions about five different aspects, the effect of ensemble size, time, philosophy, general assessment practices, and music assessment practices. Nearly 50% of respondents had thirty to sixty students in the target ensemble, with approximately 54% teaching between 7.5 and 15 hours over a two-week period of classes, and 89% of the respondents indicated that they were the only teacher in the room during rehearsals. Cross-tabulation of responses were conducted to identify trends, such as effects of ensemble size and assessment. Results revealed as the size of the ensemble increased, the likelihood of post-performance assessments decreased. Nearly 80% of respondents "sometimes" or "always" used checklists and rubrics for assessment of individual students. Those who considered assessment as "very important" also supported doing so prior to performance, upon mastery of a concept, and also by using pen-and-paper tests. Teachers who responded as "musically trained" were far more likely (90%) to utilize daily assessment and in-rehearsal observation. Tracy suggested that we tend to teach as we were taught, rather than using developing new assessment strategies other than paper-and-pencil tests, citing a lack of time as an inhibiting factor.

Russell and Austin (2010) conducted a quantitative study of assessment and grading practices of secondary music teachers. Three hundred and fifty-two Southwestern division MENC teachers, including band, choral, and orchestra directors, answered questionnaires addressing three main sections: school context and assessment framework, specific assessment strategies used in the classroom, and music teacher background. Building on the research of the

aforementioned McClung, Kotora, and Tracy studies, the survey instrument was developed after reviewing questions about assessment practices in core content areas, adapting them into a music education construct. In the school context section, 92% of participant responses suggested that administrators offered little guidance regarding how ensemble classes should be assessed. Participants averaged just over 200 minutes of instructional time per week with each ensemble. Teachers were asked about their use of two sets of assessment criteria, achievement and non-achievement. In the achievement category, 91% used performance or skill-based criteria, and 82% used knowledge-based criteria as a basis for grades. Non-achievement scores were derived from attendance factors such as concerts and rehearsals (91%), attitude factors such as in-class participation and effort (93%), and practice reports and cards (61%). Analysis of skills and knowledge-based assessments revealed that quizzes, worksheets, and exams were utilized to evaluate knowledge of music terminology, symbols, and notation, as well as concepts related to music theory, music history, and performance or pedagogical practices. Participants were asked about objectives for performance assessment, which included technique exercises, prepared performances, and sight-reading, as well as the format for those assessments, with responses including live, in-class playing, concert performances, sectionals, and audiotaped exams. 34% of teachers responded that playing exams were utilized, and 33% indicated that sight-reading was used as a performance objective. Russell and Austin noted that elements of assessment practices were consistent with expert recommendations, but noted that a disproportionate weighting was given to subjective factors such as attitude and attendance rather than indicators of musical independence other than prepared performances. Teaching level and specialization were recognized as influences on grading practices, with middle school teachers favoring knowledge-based measures as opposed to the more attendance weighted grading of high school teachers.

They asserted the importance for music teachers to share and discuss assessment strategies with colleagues as well as to provide pre-service music teacher training on assessment strategies.

Common themes were recognized considering assessment practices used by choral music educators. McClung, Kotora, Tracy, Russell and Austin each recognized the disconnect of assessment practices with measurable tasks, with more grade weighting on attendance and attitudinal factors rather than on performance or skill-based tasks. An increased grading importance on performances in high school settings rather than on individual performance or reading tasks was quantified in the Russell and Austin study. The reliance on the performance or attendance based grading priority could be attributed to a lack of pre-service training on assessment practices within undergraduate music education courses. The demands of performances, management of large ensembles, and a lack of prior assessment experiences contribute to a cycle of music teachers grading based on group observations rather than quantifiable data or measures of individual skill-based tasks.

Organization Influences on Large Group Sight-Reading Assessment

Large group assessments of sight-reading are conducted in some states as a portion of choral festivals. Teachers who participate in these festivals can draw guidance from several organizations when developing curriculum and instructional strategies. Groups such as the Music Educators National Conference (MENC) provided guiding documents with specific achievement standards for students in specific grade ranges. Also, some state organizations develop guidelines and regulations for musical selections used in statewide and regional competitions, such as the University Interscholastic League in Texas.

Norris (2004) compiled an overview of the sight-singing requirements for large-group choral festivals across the United States, drawing information from MENC, ACDA, and state

music organization websites. A majority of states conduct organized, adjudicated, large group festivals administered by the MENC or a state organization. Norris identified studies that quantified the time devoted to sight-reading instruction during rehearsal and noted more allotted time in studies conducted in states where group contest assessments take place, such as in Texas and Florida. Investigation of studies comparing group and individual achievements revealed less accurate performances by individual singers and attributed to stronger individual readers leading others within a section in group assessments. Norris suggested assessments of sight-reading at large group festivals were not in line with instruction and assessment standards delineated in the MENC National Standards (1994), and that the importance of sight-reading assessment was inconsistent with the general educational shift to educational accountability across the United States. Seventeen of the forty states offering middle school choral festivals required a group sight-reading assessment, similarly, twenty-five of the forty-three states with high school contests conduct a group sight-reading portion within the contest. The overwhelming majority of these state contests have established levels of proficiency, but only eight of the middle school and thirteen of the high school contests specify content parameters for differentiated proficiency levels. His suggestion was to analyze the structured state standards in order to develop assessments with increasingly difficult melodic, rhythmic, harmonic, and expressive concepts.

A revision of the 1994 MENC standards was introduced by the organization, renamed as the National Association for Music Education (NAfME), in partnership with the National Coalition for Core Arts Standards (NCCAS). The NCCAS developed a comprehensive arts education guiding document utilizing the Wiggins and McTighe (2011) *Understanding by Design*, or UbD, framework for curriculum development. The UbD process is predicated on the meeting endpoint learning outcomes prior to the development of specific tasks. As a result, the

2014 music Standards emphasize conceptual understanding in actual musical processes, including broad tasks such as creating, performing, and responding. These broad concepts lack the music reading task specificity of the earlier 1994 standards referenced in the Norris findings. Except for a single reference in the *Analyze* section, "using music reading skills where appropriate," the guidelines lack any task specific guidance relating to sight-reading instruction. The updated approach suggested by NAfME includes the use of Model Cornerstone Assessments (MCAs), which are developed for use by teachers to inform instructional decisions. NAfME suggests that pre-service teachers should be instructed on the use and development of MCAs, which affirms suggestions by Kotora.

In the state of Texas, the University Interscholastic League (UIL) acts as the state-wide governing body responsible for developing rules and guidelines for academic, athletic, extra-curricular, and music contests at the secondary school level. Music contests are conducted in the spring as regional concert and sight-reading contests, each with two separate three-judge panels, selected from the active and provisional members of the Texas Music Adjudicators Association (TMAA). Each panel assesses ensembles utilizing a rubric developed by a TMAA committee, with scoring ranging from I (Superior) through V (Very Poor). During the sight-reading portion of the contests, groups are given 6 minutes to study a prescribed piece of music. After the study period, the group reads the piece without piano accompaniment. Following the first reading, the group is given a second instruction period of two minutes, after which the group reads the piece a second and final time. Musical selections are specifically produced for the UIL competitions, used statewide, in accordance with guidelines based on multiple levels of performing ensemble as well as the relative size of the school. A middle school choir at a school containing a total school enrollment of 500 students reads a work that is less challenging than a school of 1200

enrolled students. Additionally, varsity and non-varsity level ensembles read different literature, with increasing difficulty for more advanced groups. As Norris indicated, a thorough review of these guidelines provide a baseline for development of group and individual tasks for mastery by students and ensembles.

The music selections are developed following the choral sight-reading criteria, listed on the UIL website for each conference and ability group (varsity or non-varsity), with specificity about the following categories: meter, key, harmony, texture, rhythm, length, voicing, text, and ranges. Meter possible ranges from simple 3/4 and 4/4 in non-varsity and smaller conferences to include cut time, 2/4, and 6/8 for 6A varsity ensembles. Middle school ensembles will only perform in the major keys of C, F, or G, whereas high school non varsity groups may encounter B-flat or D, and varsity ensembles could additionally read major or minor keys up through 4 sharps or flats. Harmony elements place an emphasis on the primary major chords of I, IV, and V, including melodic skips of thirds and perfect fourths in middle school, to including altered syllables, approached and resolved by step in the high school varsity levels. Use of polyphonic sections of texture are saved for high school ensembles, with a maximum of 30% of the piece containing such sections. Cadences are restricted to plagal or authentic cadences for all levels except high school varsity ensembles. Rhythm criteria increase in difficulty in high school ensembles to include simple syncopations in the 5A and 6A varsity divisions. Length of the selections range from 24 measures for smaller classifications to 40-44 measures for the 6A varsity selections.

Individual Sight-Reading Assessments and Methods

Research about the integration of sight-reading assessment strategies into rehearsal practices reveals several interesting trends. Directors have traditionally favored the practice of large-group assessments of sight-reading, but data suggests that support for methods of assessment that measure individual student achievement is strong. Some directors expressed difficulty with these practices for practical reasons, such as challenges with lack of rehearsal time and student management concerns during the assessment process.

Goss (2010) conducted a survey based study to determine the effectiveness of the assessment strategies used by secondary teachers in Georgia to evaluate sight-singing. Directors of students who had entered the Georgia All-State Choir auditions (N=256) were provided an online survey which posed questions about general program details, director preparation and experiences, and participation in the Georgia Large Group Performance Evaluation. Information gathered about the survey population revealed that sight-reading instruction is a priority, as 53% of directors devoted between five and ten minutes and 28% of directors between ten and fifteen minutes of instructional time during rehearsals. A significant portion of the survey posed Likert-based questions about the frequency of ten assessment methods utilized during the course of rehearsals. Large group sight-singing tests were frequently used by nearly 30% of directors, with strategies often used utilizing teacher-made or published sight-singing tests. An average of 30% of directors indicated they sometimes use small group or individual sight-singing tests, and a similar sized group employed one-on-one, in-person evaluations, even as 58% reported never using recorded evaluations. Over 80% of respondents agreed that successful choral group singing was a reflection of the reading by the individuals. Just over 55% were in agreement that individual testing was the best way to determine the sight-reading level of their students, while

44% agreed that small group testing was the best way. This data suggests that individualized assessments would be a component of the overall assessment strategy used by teachers, however, nearly 80% of the survey participants responded that they do not test individual members of their choirs because of a lack of time.

Sanders (2015) used qualitative methods to determine perceptions and beliefs about the process of teaching choral sight-singing by interviewing members of a focus group, comprised of middle school, high school, and university teachers. Similar to the Goss study, Sanders posed questions relating to the inclusion of large-group and individual sight-reading assessment strategies, in addition to implementation of certain pedagogical strategies, such as the process of audiation. In contrast to the Goss study, the interview-based approach enabled a degree of flexibility in responses provided, as follow-up responses provided more elaboration by the panelists. Interviewees were asked about how to develop self-reliant singers, preference regarding use of sight-reading methods, method materials, the effects of musical instrument proficiency on sight-singing ability, the general effect of hand sign usage on reading, and the efficacy of assessment practices. With regard to assessment practices, some members of the panel noted that the amount of time necessary to administer sight-reading assessments in an individual versus group setting was prohibitive for frequent use of the strategy. Assessing an entire section was preferred by the group, but the weakness of the measure was evidenced by a student who was not contributing equally to the success of the section. One panelist used an individual sight-reading semester exam as a means to place students in an appropriate ensemble and section in following semesters. Consensus of the group suggested that charting student growth over time and with increasing difficulty levels was more beneficial than a one-time grade, such as in an assessment that graded solely on correct pitches and rhythms.

Some research has investigated the correlation between large-group sight-reading contest ratings and the role of the individual singer in achieving a rating for the ensemble. Demorest and Henry (1994) studied two Texas high school choirs, both of which had received first division ratings at UIL Concert and Sight-Reading contests in the previous three years. They focused on identifying the the distribution of sight-reading scores for the individuals in a choir with high group sight-reading success, as well as what factors, other than method of instruction, might be related to individual sight-reading achievement. Students were tested individually in a practice room, where they were provided a copy of an example in the key of F major, adapted from Ottman's *Music for Sight-Singing* (1967). Before beginning their study period, the tonic chord and first note were played. Students were instructed to prepare as they had been taught, then the tonic chord and first note were repeated, a recorder was turned on, with a video recording as a backup method. Scoring was completed by evaluating the tape recorded performances, deducting 1/2 point for rhythm and pitch errors, 1 point for tempo change or repeating a note, and 2 points deducted for starting over. Their conclusion was that a rather broad distribution of scores for both choirs, essentially to include the outer extremes of possible scores, indicated that group sight-reading success is not a valid indicator of individual achievement for all members of a choir, even as the ensemble attained the highest possible rating at group contest. Several other factors were noted, including a correlation between prior years of piano instruction, which strongly influenced individual achievement scoring. They reported no statistical difference in sight-reading scoring between the fixed-do and moveable-do groups. A vast majority of the students tonicized, or sang the tonic I chord in broken fashion, the key prior to singing the example, as was practiced by the ensembles during rehearsal.

Demorest and May (1995) examined contributing factors related to individual performance during sight-reading. In this qualitative study of students from the first and second choir ensembles of four Texas high schools, participants (*N*=414) were tested following the sight-reading procedures used during the Texas All-State Choir auditions, a procedure similar to the Demorest and Henry study. Participants were asked to complete a questionnaire documenting their years of choral experience, years of private voice lessons on voice, keyboard, or another instrument, and their years of choral experience outside of a school setting. Each student was randomly assigned to one of two groups, which read different melodic conditions. While melody A was a rather simple example, with stepwise and intervallic movement within the primary major chords, the second melody employed a mi-fi-so passage as well as a so-fi-so cadential ending. Findings revealed that private lessons on any instrument, including voice, was a significant factor in predicting success at the individual sight-singing task, whereby the researchers suggested that study of keyboard should become a component of vocal music instruction. Scoring on the more difficult melody B was lower for most subgroups, especially when considering the differences between first and second groups within the same school. In their discussion of the scoring differences, Demorest and May argued that the literature choices for the tested ensembles would have been more complicated than the sight-reading prompts. Perhaps the sight-reading assessment context places the student into a scenario where they are only using their functional skills to read a particular level of literature developed for their state contests. One key factor that was revealed in the teacher questionnaire was that in schools that used moveable do, students were individually tested on their sight-reading ability every six weeks, which accounted for a third of their grade for the period. In the fixed do schools, students

were only evaluated once a semester. Demorest and May suggested that the systematic assessment strategy could have a significant impact on the individual assessment scores.

Building on his prior research studies, Demorest (1998) tested his theory relating to individual testing in addition to group instruction. Choirs from six high schools in the state of Washington served as the subjects, consisting of students selected from both beginning and advanced ensembles on each campus. Unlike previous studies, students were given both a pretest consisting of a major and a minor melody, adapted from Ottman's *Music for Sight-Singing*, followed by posttest using a set of similar melodies at the beginning of the next semester. Two groups were utilized in the study; as entire ensembles were assigned as an intact group to either the control or experimental group. Four weeks following the pretest, the treatment was group given a sheet of practice melodies, and were instructed to practice the melodies outside of the class, setting their own key and tempo. The treatments were conducted once a month, three times during the semester. Students were individually tested the week after the melody sheets were provided, in a process that removed four students at a time from the ensemble rehearsal to record their test in four separate testing rooms. Students were allowed to set their own key and tempo during the tape recorded individual tests. The recordings were evaluated, and written feedback was provided to the students, with general comments reinforcing encouraging students to sing scales for practice, or reminding them to set the key prior to beginning the recording. This individual testing scenario was adapted from the 1995 Demorest and May study, citing the gains made by the group who had a policy of a once a six weeks individual testing schedule. The control groups were given the same melody sheets in their ensemble classes, ensuring that both groups had some experience with the same musical material. A significant gain resulted on the major melody during the posttest by the experimental group. Demorest suggested that skills

learned as a group were transferred to individual performance gains, evidenced by the individual testing. Demorest also noted that the testing process provided meaningful information about student progress, and provided evidence about the transfer of group instruction tasks to an individual skill.

Tasks During Individual Sight-Reading Assessments

Several studies have investigated specific tasks that are processed by students during the sight-reading process, with the intent of identifying instructional practices that have a pronounced effect on scoring achievement. Some research conducted solicited responses from directors about broad pedagogical strategy choices for classroom instruction, while others have investigated rather specific decoding processes during individual student assessments. How students are navigating the process of reading, including use of behaviors transferred from group instruction to individual practice or assessments have been the subject of several investigations. Strategies such as length of study period, strategies to decode a melody by teaching discrete pitch patterns, and analysis of the prioritization of pitch and rhythm tasks are examples of researched processes shown to have an effect individual sight-reading achievement.

A single question in the Goss (2011) survey addressed the pedagogical approaches to the teaching of sight-singing used by secondary choral teachers in Georgia. A simple tally of the responses (N=256) revealed some strategies were fairly consistently used by directors. Pedagogical approaches used most frequently, including any strategy used by more than ten respondents included interval and pattern recognition, drill, practice, and repetition, using hand signs, scales and scale patterns, ear training, as well as incorporating sight-singing into the literature being studied.

Mishra (2014) conducted a meta-analysis to determine whether experimentally tested sight-reading interventions influenced sight-reading ability. A meta-analysis, a common practice in psychology and medicine fields, enables a researcher to pool all available investigative studies about a topic, coding variables in a similar form, and thereby identifying common outcomes in a larger form. Search terms used for the included studies included variants of the term sight-reading. A strict set of criteria were used to evaluate appropriate studies for comparison purposes, such as only including experimental studies that used a pretest/posttest and control group design, and ensuring that data were evaluated on both pitch and rhythm tasks by a researcher. The conforming ninety-two studies were subsequently coded using various moderator variables, which function as independent variables, enabling broad comparisons between the disparate original research studies with elements such as student experience level and type of test utilized. The studies were classified into ten categories of treatment, such as aural training, interval drill, and singing/solfege. Mishra found significant improvements in studies that used a pretest/posttest design, suggesting that the practice of the sight-reading task in itself improves the results over time. Mishra noted that the only moderator variable that had a significant influence on sight-reading was the moderator value coded for treatment effect. Treatment effects that were identified as most effective included aural training, controlled reading (eye movement), creative activities such as improvisation, and the use of singing and solfege.

Killian and Henry (2005) conducted a mixed-methods study of students (N=200), investigating the strategies used by students prior to and during individual sight-reading performance. Participants were in attendance at one of two Texas high school all-state choir camps, during which they learned the selected audition repertoire, as well as strategies used during the sight-reading component of the audition. The study procedures involved each

participant singing two different melodies, in different keys, the first with a 30-second study period, the subsequent reading without the benefit of a study period. The participants were assigned to one of three subpopulations, low, medium and high accuracy singers based on pitch and rhythm accuracy during the example. Researchers viewed a sampling of the videos, developing a list of targeted behaviors, and during review of the remainder of the videos, presence of these behaviors were documented. Strategies present in the high-accuracy group during the 30-second study period included tonicizing prior to reading, using hand signs, keeping a beat in the body, singing out loud during practice, finishing the example in the 30-second review period, and keeping a steady tempo. During the actual sight-reading activity, strategies common among the higher accuracy singers included tonicization, use of hand signs, keeping a steady beat in the body, and keeping a steady tempo. Ineffective strategies that were identified in the low accuracy group included abandonment of a steady beat, stopping during the melody, taking eyes off of the music, and shifting the body. Singers identified in the high and medium accuracy groups scored significantly higher when provided a 30-second study period than without the study period. In contrast students in the lower accuracy grouping did not benefit from the study period. A review of the demographic differences of medium and high accuracy sight-readers revealed that individual sight-reading tests and the practice of sight-reading individually were used more frequently than low accuracy readers. Noting the Demorest (1998) study, Henry and Killian suggested that teaching the individual reading strategies that are effective, in addition to addressing ineffective strategies, would benefit students during the process of individual sight-reading assessments.

Henry (2004) studied the effects of emphasizing specific pitch skills while teaching sight singing in the choral rehearsal, using two different approaches to instruction with pitch skills

emphasizing scale degrees and harmonic function. A pretest and posttest was administered to each of the participants, consisting of two melodies developed using the Vocal Sight Reading Inventory by Henry in 2001, which identified pattern based skills, such as portions of scales, or skips within a chord. Rather than evaluating each note for pitch and rhythmic accuracy, specifically targeted pitch skills were evaluated for accuracy by considering the entirety of the skill. Using similarly sized beginning treble choirs at the same high school, each were instructed on different pitch sequences over a twelve-week treatment period, melodic and within the three primary major chords. In Group A (N=41), patterns were taught using solfege drills without hand signs, absent from musical notation, but written in a way that reflected the relative height of the pitch. Group B (N=26) was taught the same note patterns as Group A, but by using familiar melodies, but rather than using the familiar words to the song, they memorized the solfege syllables for the song instead. Each group performed the same concert literature, and solfege patterns evident in the literature that were similar to those used in the treatments were reinforced. Each group scored significantly higher on the posttest in aggregate scoring. Analysis of the pitch skills as isolated tasks revealed gains in success rate from pretest to posttest, with an average increase of eight percent on the fifteen discrete tasks, and an eleven percent gain on cadential skills. A review of subgroup populations (low, middle, and high accuracy singers) revealed that the low and middle groupings made the largest mean scoring gains from pretest to posttest. The approach to teaching targeted pitch groupings may be an effective strategy for beginning students, or students in the lower accuracy group, as in the Henry and Killian study.

McClung (2008) conducted an investigation with students from three advanced mixed choirs from the North Texas area to determine the effectiveness of the use of Curwen hand signs during sight-reading. Each of the schools selected had a history of high ratings at UIL Concert

and Sight-Reading competition, and each group had daily training using moveable do and Curwen hand signs during sight-reading and literature instruction. A random sampling of students from the three ensembles were chosen randomly, with thirty-eight agreeing to participate. Two example melodies were developed, beginning and ending on tonic, with intervallic skips within the diatonic scale, and with varied rhythms, including dotted quarter and eighth note patterns. Prior to testing, participants were given an overview of the procedural differences between the two examples, noting example length, an established tempo (60 bpm), establishment of a 30-second preparation period, and distinction of reading the first example using hand signs and the second without hand signs. Following the testing procedure, students were asked to discuss the use of hand signs when they sang and if they felt they were a better sight-reader when using hand signs. Results of the two readings were compared, revealing that there was only a negligible difference in mean scores between the readings with or without hand signs. A second research question addressed the differences measured on students with instrumental experience as they used or did not use hand signs. Students with instrumental experience scored higher on both examples, but scored significantly higher when using hand signs. McClung concluded that while some students benefit from the use of hand signs, use may impede other students, and that learning mode preference may have a strong effect on student perception of the value of hand signs.

Building on her prior studies, Henry (2011) conducted a quantitative study with singers (N=252) during another summer choir camp, seeking to determine the interaction effects of pitch and rhythm skills as they occurred simultaneously. The primary research questions dealt with the level of pitch accuracy when rhythm tasks are present, and conversely the level of rhythmic accuracy when pitch tasks are present. Henry utilized prior work developed for her Vocal Sight

Reading inventory, selecting twenty-eight discrete pitch tasks and fifteen distinct rhythm skills. From these tasks, she identified nine pitch and rhythm skills of varying degrees of difficulty, for use during the study. A review of the examples and underlying tasks revealed pitch tasks that varied from simple ascending (*d r m f s*) and descending (*s f m r d*) scale patterns categorized as easy, to skips within the IV chord (*f l d*) and the ii chord (*r f l*) categorized as difficult. Rhythmic tasks included dotted eighth/quarter values categorized as easy, to hard tasks such as syncopated sixteenth/eighth and eighth/quarter values. Using three of the selected rhythm/pitch challenges per example, three separate melodies were developed into material for the trials. Participants completed a survey consisting of demographic and choral experience questions, as well as a self-evaluation of sight-singing skills. Participants were assigned randomly to a testing room with one of the melodies, where they were given instructions about the trial. Students followed the all-state choir sight-reading protocol, which includes playing the tonic chord and starting pitch, a 30-second study period, followed by a second playing of the tonic triad and starting pitch, after which students read the example. An evaluator scored the students in real time, giving one point for each of the three rhythm and three pitch skills, one point for maintaining a steady beat, and one point for ending on tonic. Evaluation of results indicated several key findings about the relationship of pitch and rhythm prioritization during sight-reading assessments. Data showed that rhythmic success was a significant predictor of pitch success, although many who did not perform the rhythm correctly were able to sing the correct pitch, regardless of the difficulty level of the tasks. Drawing on her study with Killian in 2005, Henry hypothesized low and medium accuracy singers prioritized pitch over rhythm, evidenced by their abandonment of keeping a steady pulse in both the 2005 and current study. She also suggested that while rhythm systems may be a portion of classroom instruction, students may not transfer the counting system

processing while simultaneously using a system for pitch, such as moveable or fixed do. As in other reviewed studies, students who had instrumental and piano experience sight-read at a much higher accuracy level than those who did not have such training.

In contrast to individual studies by Henry, Demorest, and Killian, Mishra concluded that treatments utilizing interval or rhythmic drill, as well as training on an instrument did not statistically improve sight-reading. Group instructional practices that focus on discrete tasks that can be used to decode a sight-reading example in a relatively brief study period are of great value to low accuracy readers. Several researchers indicated that singing the tonic chord prior to a reading has a positive effect on scoring. Discrete aural training skills, such as drilling skips between notes comprising the primary major chords provide a path to more accurate performance. The challenge in finding which strategies have a pronounced effect on a particular student requires individual assessments that identify learning gaps through evaluation of pitch and rhythm reading in concert.

Use of Technology-Based Assessment Tools

In all of the previously reviewed studies, the procedures for evaluating students have involved a researcher either grading a student in real time or from a recording, with a majority scoring each individual note for accuracy of pitch and rhythm. The time required for grading these individual assessments is a prohibiting factor for a number of choral teachers. Most software sight-reading evaluation tools provide students a percentage based score derived from correct pitches and rhythms, which can be sent to directors in the form of a report. Additionally, such tools often record the multiple attempts students have made on an example, which provides teachers the opportunity to review student assessments for tone and technical measures. Several

studies have evaluated the efficacy of such tools and related processes as an alternative to recorded, teacher scored assessments.

Buck (2008) examined effects associated with the use of SmartMusic as an assessment tool with high school band students (*N*=46). This study was designed to determine if students who used SmartMusic as an assessment tool achieved greater technical skills in addition to providing a tool to increase knowledge and skills. Using a pretest/posttest design, two groups of students, balanced by instrument family, followed a similar protocol over five fifteen-minute lessons taught during a three-week period. Prior to the trials, students were given a thirty-minute training and information session. A pretest questionnaire collected general demographic data, beliefs about their musical and computer ability level, and their practice habits. Students were then pulled out of their ensembles for an individual lesson by the primary researcher. After providing cursory guidance and the appropriate instrumental etude, students were given thirty seconds to peruse the example, then recorded their assessment using SmartMusic. Students in both control and test groups were provided pedagogical methods on a researcher developed *Student Practice Rubric and Chart*, and instructed to keep a journal of their practice time, which was reviewed during subsequent sessions. The test group students were instructed to use the SmartMusic assessment module, providing technology enhancements including error detection (red note/green note), recordings, a metronome, and practice looping capability. Posttest student surveys were used to determine student and teacher perspectives of efficacy of the process and *SmartMusic*. A panel of judges evaluated recordings of the pre- and post-test etude performances using a rubric consisting of tone, intonation/pitch accuracy, rhythm, technique, interpretation/musicianship, and articulation prompts, with students assigned scores between the high of five, and low of one. The researcher used recordings to determine a technical skill score,

which was combined with scoring data of the etudes to arrive at a composite score. Both groups showed improvement from pretest to posttest, although the SmartMusic group showed slightly higher gains than the control group. Survey questions addressing perception of their individual performance indicated that more students in the SmartMusic assessment group believed that they had improved than students in the control group. Although addressing performance as opposed to sight-reading, the student improvement placebo effect is interesting, as students who believe that they have been given instructional tools to complete a performance task are more likely to complete the task.

Johnson (2013) conducted a quantitative study to assess the influence of peer-assisted learning structures with band students, using SmartMusic as a method to test sight-reading gains of students as a result of the collaborative instruction model. A total of six Colorado middle schools participated in the study, encompassing a socio-economically diverse grouping of students. Of interest to this research was the methodology of the technology-based assessment utilized in Johnson's study. Although not the primary research objective, pretest and posttest sight-reading assessments were conducted to correlate the effectiveness of the treatment conditions. The study employed intact groups were used to test the efficacy of matched or divergent ability grouped peer assistant learning styles. Subjects (N=261) were given an objective based examination to determine baseline music competency, as well as a student self report survey including requests for demographic and socio-economic information. Over the twelve-week intervention period, students were provided instructional materials to help develop sight-reading achievement, including worksheets addressing rhythm reading, composition exercises, sight-reading etudes, and general music theory knowledge, including key signatures and the order of flats and sharps. His assessment of sight-reading ability used two self-

constructed etudes, one for pretest and posttest conditions, derived from a methods book used both testing groups during the study period, consisting of first five notes of the Bb major scale, in 4/4 time, without tempo or dynamic changes, and set for a quarter note at 78 beats per minute. During the sight-reading pull outs, the SmartMusic assessment module was used to evaluate pitch and rhythm accuracy in the form of a percentage correct score. Trials were also recorded on a digital MP3 device as a backup. Mean sight-reading achievement increased for students at each school, but the primary testing outcome that was tested was the outcomes attributed to the peer-assisted learning models that were used over the course of the study. In his analysis of pretest/posttest sight-reading achievement change, Johnson noted that both testing groups achieved increases that were similar across schools, indicating a high degree of statistical reliability of the sight-reading assessment.

During a Henry (2014) quantitative study with students (*N*=138) attending an all-state choir music camp, SmartMusic was used as an individual sight-reading assessment tool. The goal of the study was to test student perceptions of technology sight-reading assessment. During the camp, students took two elective courses, and any student who was classified as beginning sight-reader took the sight-reading fundamentals class. Advanced sight-readers were given the option to take a separate section for their ability group, which contained an overview of some of the more advanced features of the SmartMusic tool, in addition to instruction that was informed by prior research studies. A large majority of study participants indicated that individual assessment was a part of their choral program (74%), using live performance for a director as the testing mechanism. Participants gave their opinions about the technology component before and following the actual sight-reading assessment through a survey-based instrument.

During this study, participants read three different melodies. Scoring was computed as a percentage of pitches and rhythms correct, which ranged in the trials between 2% - 100%, with a mean score of 35.81%. As in prior Henry studies, students were sub-grouped according to their relative accuracy on the assessment as judged by a live evaluator, for results discussion purposes. A balanced grouping of students comprised each of the three accuracy groupings, although the distribution of scores evaluated by the program varied widely, including a 3% - 86% range for the advanced students. Survey analysis indicated that those who were in the higher accuracy grouping were more likely to have participated in individual assessments in their classroom.

Henry noted that some participants demonstrated challenges with the process, as some expressed that they were not accustomed to using a predefined tempo or were unsure when to begin the reading, resulting in some low scoring across all three ability groups. While many had noted that individual assessments were a part of their classroom experience, almost half self-reported that they did not regularly practice the process of individual sight-reading. Student opinions changed regarding the use of technology for this specific type of assessment. The pretest opinions, balanced between favorable and unfavorable, shifted dramatically to the unfavorable, indicating a negative first experience with this technology, most directly related to the inability of students to set their own tempo. Those indicating favorable responses commented that the strict tempo was a benefit. Henry's results supported the potential for the usage of technological tools to individually assess students, but cautioned that the introduction of the technology to the testing environment should be thorough and allow for practice for students to be comfortable with the process.

Methodology

This study explored a protocol of group vocal sight-reading instruction in a high school choral classroom which was informed by individual assessment strategies in an effort to increase the achievement level of the entire ensemble. Data gained from an individual sight-reading assessment tool, *Music Prodigy,* was used to analyze and determine specific gaps in rhythm and pitch recognition. Using these rhythmic and pitch error trends, pedagogical strategies during group ensemble instruction were modified and developed to counteract the trends. Students responded to questionnaires after each assessment to determine perceptions about the efficacy of the specific strategies and to monitor behavioral stressors from the testing process. This project could be described as a quasi-mixed methods study, containing both quantitative, experimental, and qualitative (student feedback) elements.

Design

This action research study was designed to evaluate the efficacy of group pedagogical factors on vocal sight-reading. In tact groups of students were instructed using a specific pattern sight-reading strategies over a six weeks. Following the interrupted time-series design model, students were tested to determine a baseline using the sight-reading assessment application, *Music Prodigy*. Multiple pretest opportunities were conducted, providing a max score for each subject. Following the pretest, instructional strategies were evaluated using a post-assessment student survey. Audio trials recorded by the application were reviewed to identify learning gaps revealed during the individual assessment trials. Following a series of strategic learning interventions, a posttest was conducted, along with an exit questionnaire used to identify trends about student meta-cognitive changes over the study period.

Participants

Participants in this study were choir students at a suburban high school in Central Texas. Schools in Texas are classified by the number of students that are enrolled at the school based on a statewide enrollment check on a specific day early in the school year. This school is classified as 6A, with an enrollment of over 2500 students, which is a moderately sized campus when compared with other 6A schools, the largest classification in Texas. Choral classes are arranged primarily by years of experience in the high school program. For example, freshman girls are placed in a non-varsity treble class, sophomore girls are placed in a non-varsity mixed ensemble, and junior and senior girls are generally placed in the varsity level mixed ensemble. In some instances, students are advanced into classes due to schedule conflicts and other factors. There is no limit on class sizes, but the average class size is generally thirty students. Students are placed in the classes without formal demonstration of individual sight-reading skills, rather, the placement follows the sequence of group contest skills that are taught year over year. As all teaching strategies will be consistently applied to each ensemble, grouping of students will occur through use of the prior years of choral study in middle school and high school.

Procedures

Participant recruiting. Upon receiving institutional review board approval (Appendix A), one-hundred twenty-four students were recruited to participate in the study from choral ensemble classes. Interested students were provided a parent permission form, which was to be completed and turned in within three class days. Following submission of completed forms, students were assigned a random number to ensure anonymity during the study. Forty-seven students who returned permission forms were read an assent script, and those who affirmed their

consent to participate were allowed to continue. Over the process of the study, five students removed themselves from participation, thus reducing the final student population to ($N = 42$).

Account setup. Participants were removed from rehearsals as a group to create an individual student account for use with the *Music Prodigy* sight-reading assessment application. Students were guided through the setup process using school-provided laptop computers using a set of instructions (Appendix B) made available using the *Canvas Learning Management System*. Students used their assigned subject identification number as their name within the *Music Prodigy* to ensure a level of anonymity in reporting. Student logins consisted of their district-assigned email address, with a common password for all participants. *Music Prodigy* collects some general demographic information in order to tailor instructional content to the end user. Students were instructed to select the appropriate choices and their own voice part. The final setup step was to self-enroll into the teacher created class, which was customized into multiple sections of the same course. Test subjects were given a brief overview of the operation of the app, where the instructor used a personal account enrolled as a test student, to demonstrate assessment procedures. Students were instructed how to set the microphone level to ensure recording and how to initiate the actual assessment, including the counting procedure that precedes the recording. Students were then sent back to join their ensemble, which was already participating in a rehearsal that was co-taught by a colleague.

First trial and survey. Individual trials were conducted by removing the test subjects from the rehearsal during the single-line sight reading portion of the rehearsal. Students used district-provided iPads, running version 2.3.2 of *Music Prodigy* on iOS 9.2.1 to complete the recording task. Once connected to the Wi-Fi network, students logged into the application using

the process modeled in small group instructions. Students proceeded through a three-step pretest trial phase.

Step one of the trial involved completion of a teacher-developed practice example written in the key of F major (Appendix D). This example was only four measures long, consisting of quarter note, half note, and whole note rhythmic values. The ascending major scale with repeated notes on each scale degree comprised the example. In order to insure success, this first example was pre-taught to students, allowing them to focus on mastery of the software rather than mastery of the sight-reading prompt. Once students demonstrated mastery of the trial with a score of 80% or higher, they were instructed to move on to the second step. During the second step, students completed trial #1 with tested material. Using the Understanding by Design method of planning for end student achievement goals, a melody was derived from a previous year UIL sight-reading example for non-varsity choirs. The melody was eight measures long, written in the key of F, and in 4/4 meter. Modifications were made in the example to include testing of the scale by thirds patterns used during group sight-reading instruction. The final step involved completing an online survey developed to identify student perceptions of the efficacy of group instruction strategies on the sight-reading evaluation process. A sample of the first online survey is attached as Appendix E.

Group instruction and modifications. Classes on this campus consist of an alternating A/B block, with the instructional period lasting 90 minutes every other day. Group sight-reading instruction for purposes of the study period consisted of an approximately thirty-minute portion of class. The remaining sixty minutes of class time are devoted to literature preparation for the concert portion of the festival competition. During the first third of classes, the typical rehearsal begins with vocal technique exercises, followed by rhythm concentration, and subsequently work

with pitches, scales, and patterns before reading any single line or multiple part sight-reading exercises. A plan of instruction is included as Appendix C.

An essential question the study sought to answer was about the efficacy of group instructional practices in preparing students to individually sight-read an assessment. To test this concept, a similar plan of instruction was followed in all three ensemble classes, with appropriate levels of difficulty within the structure of the rehearsal that were suitable for each group, consistent with guidelines from the University Interscholastic League for sight-reading literature. For instance, during the rhythm focus, more challenging rhythm patterns including simple syncopations were used with the advanced ensemble, but not with the beginning students. While the three minor scale types were drilled with the advanced groups, these concepts are only introduced with the beginning and intermediate ensembles. During the single line group sight-reading focus time, a program called *Sight-Reading Factory* was used to generate random prompts based on teacher-selectable factors, such as key, meter, and pitch and rhythm complexity, using higher level choices with the more experienced groups. The rehearsal sequence is intended to model the *Understanding by Design* method of planning for students to meet long-term instructional objectives.

To isolate the task of rhythm, groups were asked to count eight-measure rhythm prompts using a variant of the Eastman counting system. The majority of rhythmic values consisted of patterns that were more difficult than the festival material, including those patterns listed in the UIL guidelines for varsity level choral ensembles. Isolated pitch drills included scale exercises consisting of major, minor, and scale patterns, such as the scale by thirds. In this pattern, students move up a third, down a second, repeating the pattern in both ascending and descending forms. An exercise consisting of arpeggiated singing of the I, IV, and V chords in major keys was also a

component of the rehearsal plan. To drill specific intervals that are challenging, the director hand signed a particular note, followed by the students matching and tuning the note before moving to the second note. Once students mastered the particular interval, the ensemble moved on to the next interval set. A set of single-measure flash cards consisting of common patterns contained in UIL sight-reading octavos was used to build the skill of audiation. In this exercise, a single row of students sang the measure, while the remainder of the students were instructed to "whisper sing" and hand sign the given measure. Students then were given multiple single line melodies to read as a class, using the software program *Sight-Reading Factory*, which enabled the level of the example to be tailored to the experience level of the ensemble. Finally, the ensemble sight-read an octavo used during a prior UIL Sight-Reading competition, specifically at the level of the ensemble.

Following a data review of reports generated by *Music Prodigy* and an evaluation of student surveys, changes to the rehearsal protocol were made. An item analysis was conducted to quantify the specific pitch or rhythm inaccuracies for all students. During the interval drill portion of the rehearsal, these specific challenges were reviewed and reinforced.

Final trial and survey. After a week integrating these strategies, a posttest process, essentially similar to the pretest round, was conducted. A second melody, this time derived from a varsity level UIL sight-reading octavo, was modified to the same key and meter as in the first trial. Similar rhythmic patterns were used, but the altered syllable *si* was utilized in the fourth measure, approached and resolved by step, testing a pattern that was integrated into the group instructional sequence. Students were given three opportunities to complete the assignment. After demonstrating an 80% mastery of the trial or completion of the three possible attempts,

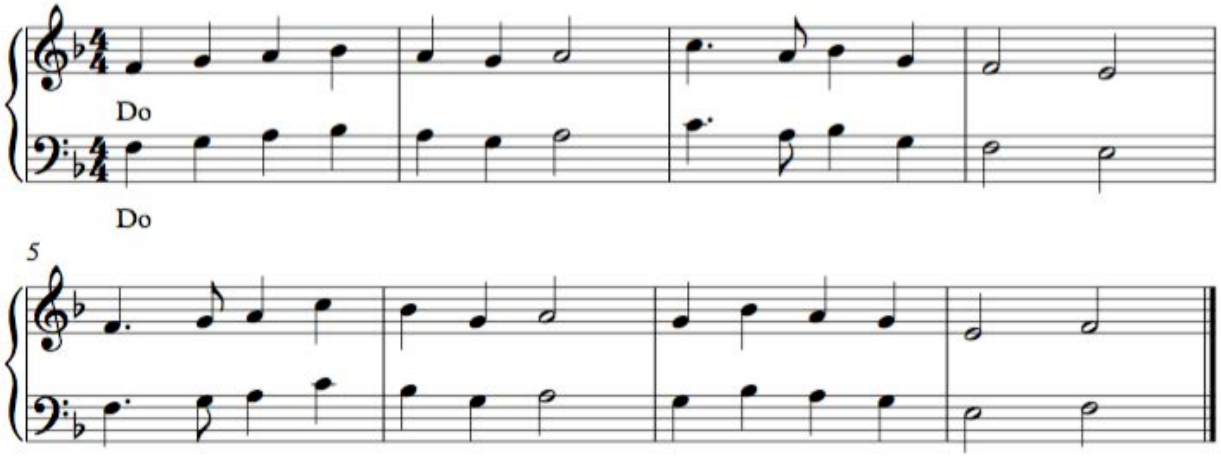
students were instructed to complete an exit questionnaire, slightly modified from the initial survey (Appendix F).

Results

Trial 1

The pretest trial consisted of three components, a rehearsed introductory sight-reading example, an eight-measure trial, and a questionnaire completed following each of the tested trials. A total of thirty-four students completed the practice exercise, representing 72% of the initial group of participants. Twenty-seven of the students obtained a perfect score of 100%, and the average score was 95.4%. Forty-two students completed Trial #1, including eleven perfect scores, an average score of 82.7%, and a range between 12% - 100% accuracy. A majority of the male students initially experienced challenges recording a score, as the example prompt was written in the treble clef. Two of the five males recorded a score, but the others did not receive a score, even when reading the example in the presence of the researcher. This condition was corrected after consultation with *Music Prodigy* technical support, and the data is inclusive of the final pool of subjects.

Figure 1 – *Sight-reading prompt 1*



Trial 1 survey. Forty-three responses were recorded, although several questions had omissions or were incomplete, and one student had submitted a response, but decided not to continue in the trial following the first trial. Question 1 was a Likert-scale based prompt seeking student confidence levels on various group and individual assessment types. Data, listed in Table 1, revealed that students were somewhat to very confident in entire class reading assessments, in both single and multiple part examples. Individual assessment responses revealed less confidence, especially on a single attempt using software to evaluate the student.

Table 1. *How confident are you in your ability to sight-read in the following situations?*

How confident are you in your ability to sight-read in the following situations?							
Answer Options	Not confident at all, very unsure	Somewhat unsure	Neither confident or unsure	Somewhat confident	Very confident	Rating Average	Response Count
Entire class reading, all reading same 8-measure	0	0	1	11	31	4.70	43
Entire class reading, multiple part example (UIL Sight-	0	0	1	20	22	4.49	43
Individual sight-reading, using software application to score, with one attempt	4	7	7	17	8	3.42	43
Individual sight-reading, using software application to score, multiple attempts	2	4	4	14	19	4.02	43
						answered question	43
						skipped question	0

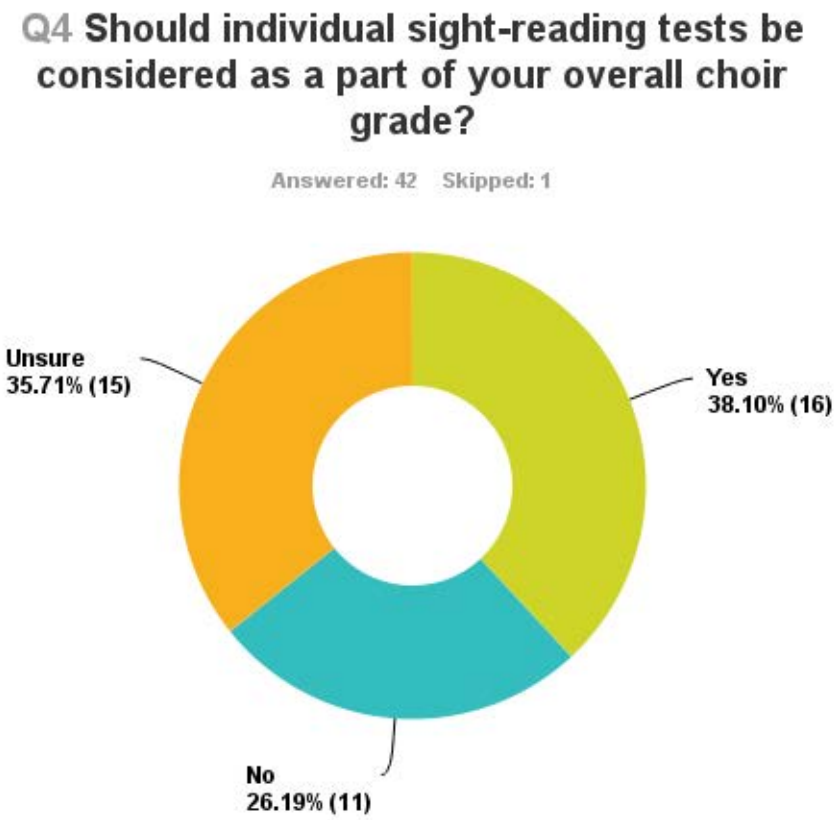
Question 2 addressed how students perceived the benefits of certain pedagogical approaches to decode pitch and rhythm during group sight-reading tasks. Most students agreed that skills including isolated rhythm reading exercises, repeating specific pitches following director prompts, singing scales, including the scale by thirds pattern, and singing an arpeggiated chord drill using the primary major chords were somewhat to very beneficial strategies. While all of the skills listed in Table 2 are considered beneficial by the majority, it is interesting to note that single measure flash cards drill and the audiation process received three respondents stating that the tasks did not help or hinder.

Table 2. *Efficacy of skill building exercises in sight-reading preparation*

How effective were the following skill building exercises in preparing you to sight-read in a group?						
Answer Options	Not beneficial	Did not help, did not hinder	Somewhat beneficial	Very beneficial	Rating Average	Response Count
Rhythm reading (group counting)	0	1	14	28	4.63	43
Singing Scales	0	0	11	32	4.74	43
Singing the scale by thirds pattern (D M R F M S F L S T L D	0	0	7	36	4.84	43
Singing the Primary Chord Drill (D M S M D S D, D F L F D L	0	0	6	37	4.86	43
Singing back hand signs/intervals (director shows a sign,	0	1	12	30	4.67	43
Single measure flash card drills	2	4	17	19	4.21	42
Entire class sight-reading a unison melody	0	3	12	28	4.58	43
Chanting with your section before sight-reading	0	2	10	31	4.67	43
Teacher identifying potential trouble spots	0	0	6	37	4.86	43
Silent singing (whisper singing, audiating)	0	4	16	23	4.44	43
					answered question	43
					skipped question	0

Question 3 asked how effective certain skill-building exercises were in preparation for individual sight-reading assessments. A higher percentage of students selected did not help or hinder responses when comparing individual and group strategies. Responses to question 4, shown in Figure 1, sixteen respondents indicated that individual sight-reading tests be considered as a part of an overall choir grade, while fifteen responded unsure, and eleven disagreed with the practice. Thirty respondents affirmed that the process of sight-reading individually with an app that provided a numerical score helped them understand how well they sight-read, although twenty-seven students (64%) stated that they did not listen to the recording of their assessment. Twenty-four (57%) students responded that individual sight-reading assessment made them feel more confident about their ability to sight-read as a part of the group.

Figure 1. *Student perception of sight-reading tests as a component to determine grades*



Demographic results revealed that thirty-six of the study participants were female and four were male. Student grade levels were fairly equally represented, with eight freshmen, thirteen sophomores, ten juniors, and ten seniors. The average years of experience in high school choir was 2.54, and the average years of middle school choir experience was 2.61, with twenty-five responding they had three years of experience. Participants were involved in one of three choirs, twenty-four enrolled in the varsity mixed choir, five enrolled in the freshman women's choir, and eleven enrolled in the non-varsity mixed choir.

Trial 2

The posttest trial consisted of two components, including an eight-measure trial and a questionnaire completed after reading the trial. A total of forty-two students completed this trial, representing 89% of the original participant pool. Scoring distributions for Trial #2 included eight perfect scores, an average score of 80.2%, with a range of 3% - 100%.

Figure 2 – *Sight-reading prompt 2*

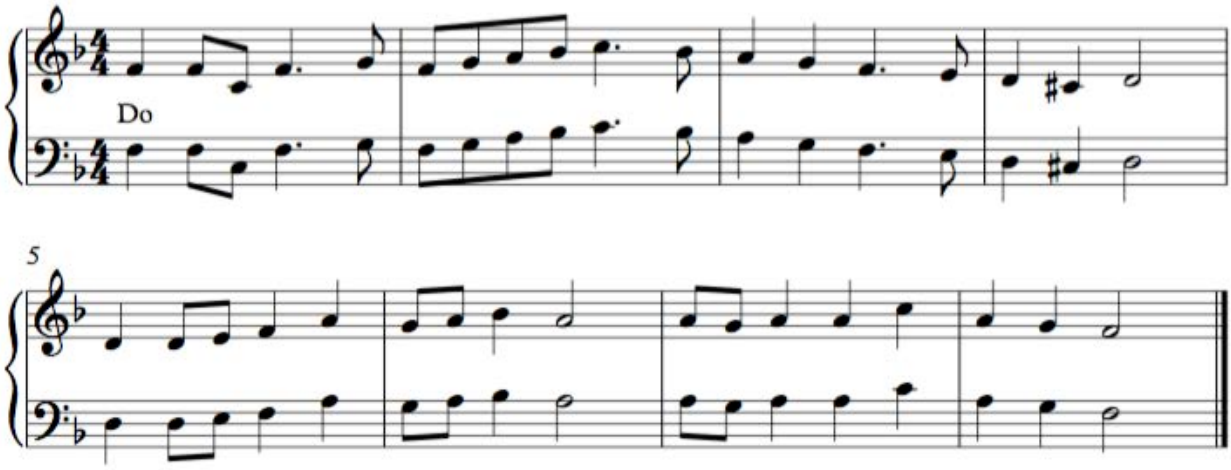


Table 3. *Comparison of Question 1 Responses on Pretest/Posttest Trials*

Answer Options	Trial	Not confident at all, very unsure	Somewhat unsure	Neither confident or unsure	Somewhat confident	Very confident	Rating Average
Entire class reading, all reading same 8-measure example	*1*	0	0	2	7	34	4.74
	2	0	0	1	11	31	4.70
Entire class reading, multiple part example (UIL Sight-Reading)	*1*	0	0	2	18	23	4.49
	2	0	0	1	20	22	4.49
Individual sight-reading, using software application to score, with one attempt	*1*	7	6	9	16	5	3.14
	2	4	7	7	17	8	3.42
Individual sight-reading, using software application to score, multiple attempts	*1*	0	6	5	19	13	3.91
	2	2	4	4	14	19	4.02

Trial 2 survey. The exit questionnaire (Appendix F) evaluated student perceptions concerning the efficacy of the individual sight-reading assessment process. Question 1 was identical to the first question asked in the first survey, in order to evaluate whether student

confidence levels on various group and individual assessment types changed over the course of the study. Table 3 provides a comparison of responses from the pretest and posttest surveys. Results were generally the same as the pretest questionnaire, but when considering individual sight-reading trials that use software application to score the assessment with one attempt, the average ranking was marginally higher during the second trial, and more students indicated that they were neither confident or unsure or somewhat confident. When asked if individual sight-reading tests should be considered as a part of the overall choir grade, student responses were mixed, with seventeen agreeing, fourteen disagreeing, and twelve indicating they were unsure. In question 3, thirty-three students (76%) affirmed that the process of sight-reading individually with an app that provided a numerical score helped them understand how well they read. Question 4 asked if students had listened to the recording of your sight-reading assessment following their attempt. Fifteen students (35%) responded that they had listened, while twenty-eight (65%) did not. Twenty-four students affirmed that the individual sight-reading assessment made them feel more confident about their ability to sight-read as a part of an ensemble, as opposed to the six who did not or the thirteen who were unsure.

The next set of questions were Likert-based questions that asked students to evaluate how beneficial certain technology enhancements were to understanding their level of accuracy during the reading exercise. Eighteen students responded that the red/green notes displayed during the singing were somewhat beneficial, and twenty-two considered this enhancement very beneficial. Eighteen students responded that the vertical line over the notes were somewhat beneficial, and fourteen felt they were very beneficial. Thirty students indicated that the constant metronome and the red numbers displayed to count students in were very beneficial, with only two students indicating the enhancement was somewhat distracting.

The following group of questions allowed students to evaluate the challenges experienced during the individual sight-reading trials specifically related to the technology. During completion of the practice example, fourteen reported no trouble, twenty-one indicated that they had minor difficulty, but could complete the assessment, and eight indicated that they had difficulty, but could complete a portion. During completion of the first trial, seven students indicated that they had difficulty, but could complete a portion, while sixteen had minor difficulty, but could complete the assessment, and nineteen reported no trouble at all with the assessment. On the final trial, twenty students indicated that they had minor difficulty, but could complete the assessment, six experienced difficulties, but could complete a portion, and seventeen reported no trouble at all with the assessment.

A mixed-methods approach was used to gain insight about the types of difficulties experienced by students during each of the three assessment trials. Response-based survey logic was employed, where students who indicated that they had no trouble with the assessment were directed to the following question, but students who had even minor difficulty were given an opportunity to describe their challenges in a comment box. Comments by students were varied, but were generally related to issues that were described as the trials not loading on their iPad, as a result of connectivity to the internet, and lack of familiarity with the interface. A review of text responses during Trial #1 showed that students had less trouble manipulating the app, and had more issues with the actual content of the examples, citing rhythm concerns most frequently, as well as challenges maintaining pitch during the example. Responses by those who reported trouble on the final trial were similar those on Trial #1, relating to rhythm, including the spacing of the visual prompt, difficulties maintaining pitch, and a lack of clarity between practice and assessment scores listed on the student review pages.

The last set of questions were designed to provide demographic insight into the results, similar to the end of the first questionnaire. During the exit survey, student ID numbers were added to help identify trends of sub-group populations revealed during the actual authentic assessment portion of the second trial.

Discussion

This action research study was designed to develop group sight-reading practices through the process of individual sight-reading assessment utilizing technology. It is important to note that a control group was not employed during this study, as this was a practitioner based action research project to test certain pedagogical approaches. Three questions were considered during this study:

1. What does the research suggest with regards to pedagogical approaches to classroom instruction to increase vocal sight-reading achievement?
2. Does the individual assessment of vocal sight-reading increase the likelihood of achievement as an ensemble?
3. Do technological challenges that emerge during assessments have a significant effect on the individual sight-reading process?

Research Question 1

The primary question of this study was to identify what research suggested regarding pedagogical approaches to classroom instruction to increase vocal sight-reading achievement. Several studies suggested that individual measure of student performance achievement should be employed for students to demonstrate mastery of specific tasks. This project employed techniques derived from several individual sight-reading assessment studies to inform the

process of gathering data and developing reliable sight-reading prompts. A timeline of the study period is located below in Table 3.

Table 3 – *Study timeline*

Week 1	*Music Prodigy* setup	Student account creation
		Student trials created and uploaded
		Students introduced to app operation
		Group instruction plan used during all classes
Week 2	Trial 1	Students removed from class for individual assessments
		Following assessment, students compete survey
Week 3		Review of data using item analysis
		Modification of group instruction
Week 4	Trial 2	Students removed from class for individual assessments
		Following assessment, students compete survey
Week 5		Review of data using item analysis

Two pedagogical approaches were employed to determine the efficacy of group sight-reading instructional practices. First, a consistently applied instructional plan was used in all ensembles throughout the study period. Secondly, an evaluation instrument was used to measure student perceptions about those instruction practices following an individual sight-reading assessment using an iPad based app.

One of the often cited challenges revealed during the accompanying research was the issue of time necessary to conduct in-class individual sight-reading assessments. In order to individually assess students, they must be removed from the ensemble rehearsal. As such, devoting time for the individual assessment process is a challenge, but by only sending out a small group at a time, as in the Demorest study, only moderately affected ensemble rehearsals. The technique portion of the rehearsal plan was modified to allow test subjects to individually test while the remaining students in the ensemble were tasked with a single line, group performed sight-reading prompt, enabling all students to demonstrate mastery of a unison

example. The use of multiple iPad devices with the Music Prodigy app allowed students to move about the music building to completed their assessment, rather than setting up specific practice rooms with recording devices.

A similar rehearsal order was utilized in all ensembles to build skills using strategies for rhythm and pitch patterns. Rhythm isolated exercises, single-line group sight-reading prompts, and teaching patterns derived from festival-based group sight-reading prompts were sequenced to match material utilized during choral sight-reading contests. Through repetition of these group instruction strategies, the assumption was that students would apply the same strategies during individual assessment.

The first individual sight-reading trial was attempted by 42 students. Scores on the trial ranged from a low of 12% to a high of 100%, achieved by eleven students, and an average score of 81%. The second individual sight-reading trial was also attempted by 42 students. Scores on this trial ranged from a low of 3% to a high of 100%, achieved by eight students, also with an average score of 81%.

Pretest and posttest surveys were administered to measure student perceptions of the efficacy of the group instruction strategies following individual assessment trials. During the first survey, students were asked to evaluate each of these pedagogical approaches using a Likert-based matrix scale. Survey data revealed that the vast majority of students felt that many of the skill building techniques were helpful in preparing for group sight-reading tasks. Only the single measure flash cards drill and the audiation process received a lower statistical rating. Comparing surveys following both trial, mean scores for student confidence levels during individual sight-reading assessment tasks with one attempt increased from 3.14 to 3.42, while support for assessments with multiple attempts increased from 3.91 to 4.02. On the final survey, twenty-four

students responded that individual sight-reading assessment made them feel more confident about their ability to sight-read as a part of the group, with six stating they did not feel more confident, and thirteen selecting the option, unsure.

Use of an authentic assessment method based on student performance is preferable to the participation based methods revealed in the McClung, Kotora, Tracy, and Russell and Austin studies. Informal questioning of students involved in the study revealed a fear that the assessment grade expressed as a percentage of rhythmic and pitch accuracy used as a grade could significantly lower their grade. Their concern was that students in the low accuracy sub-population would be grade penalized for their lack of experience sight-reading if expressed as a percentage, although they may demonstrate skill development growth at a higher rate than their peers. With this concept in mind, I would suggest that individual sight-reading testing be considered for formative assessment, used to inform following rehearsal approaches.

Research Question 2

The second research question investigated if individual assessment of vocal sight-reading increases the likelihood of achievement as an ensemble. Individual sight-reading assessments were derived from literature used at group sight-reading contests. An item analysis was conducted following each trial to identify individual pitch and rhythm error trends, which were subsequently isolated during group instruction. Modifications were made to the rehearsal materials, and students were retested with sequentially more difficult pitch and rhythm tasks. Group sight-reading was evaluated with the intact ensemble, following the festival sight-reading competition protocol.

Music Prodigy uses several different methods of reporting for teachers and students. Students can review their results immediately as they are singing, through the display of red

note/green notes overlaid on the assessed example. The software creates a report in a PDF format available for the student to immediately send to the teacher following their assessment, which also displays red/green notes over the assessed example. An example of this report is attached as Appendix G. Once each trial was concluded, recordings and reports were analyzed to gather the specific pitch and rhythm tasks that proved difficult, through an item analysis.

Item analysis. To develop a pitch item analysis, reports were created using a simple tally of missed notes. Using Microsoft Excel, each of the individual notes, expressed as solfege syllables, were written in a row, one syllable per column. Each of the red notes errors were tallied to determine the total number of misses of a specific note by the entire study group. Isolated review of the missed and preceding notes was conducted in all ensembles. From an assessment perspective, this item analysis yielded a set of challenges across a subpopulation, which then informed instruction or review of specific intervals. Using the item analysis in concert with the grouping concepts modeled by Henry informs instruction by revealing intervals that are common among groups of differing ability level and experience. Also, through the use of the filtering capability within Excel, analysis of subgroup trends was conducted. An item analysis for trial #2 was completed using this method, and is attached as Appendix H. These item analyses were used to inform classroom instruction, as the specific errors revealed were reviewed in isolation exercises during the director hand signed portion of the group instructional period.

Trial 1 analysis. Rather than using the red X notes visible in student reports, correct and incorrect notes were scored by cross-referencing the scoring evaluated by the app with a researcher-evaluated review of the student recordings. During each trial, recordings are captured for student and teacher review. Listening to each recording for students who made less than 100%, tallies were logged for each missed note. A coding system was developed to evaluate

whether the missed note was caused by a rhythmic (r) or pitch (p) inaccuracy, or both (b). Using the same filter technology in *Excel*, subgroup population data were analyzed. The third measure utilized a *so mi fa re* pattern, which was a portion of the scale by thirds pattern taught during the common instructional period. Analysis of this measure showed that ten students missed note two, while nine students missed notes three and four. When evaluated by subgroup, five of the eleven missed second notes were performed by the eight students in the low accuracy group, and the remaining six misses were by the remaining thirty-four students. Further item analysis showed that these five students from the low accuracy group missed both rhythm and pitch, while four of the six higher accuracy singers only missed the pitch, with one missing rhythm only, and one missing both rhythm and pitch.

Trial 2 analysis. The trends in trial #2 suggested that students had issues with the first measure do to low so skip. Henry's model of low accuracy singers could be expressed as the lowest 40% of students who were assessed, consisting of grades below 80%. Of this subpopulation, thirteen of the fourteen students missed this do so do pattern. Only nine students missed the more difficult la si pitch challenge in the fourth measure out of this same subpopulation. Comparatively, students in the middle and high accuracy groups, with scores above 80% were far more successful. Nine of the twenty-nine students comprising this group missed the *do so do* pattern, and only three of these students missed the middle *si* of the *la si la* pattern.

Group sight-reading. The process of individual assessment was new to study participants, as the majority of time devoted to sight-reading assessments have been entire ensemble evaluations, consistent with the practices revealed during research for this project. Students reported during the first survey that they were more comfortable with entire class

reading assessments, in both single and multiple part examples than during individual assessments, especially those that only allowed for a single attempt. While some students also indicated support for individual sight-reading tests as a part of an overall choir grade, several were unsure. Most students agreed that the process of sight-reading individually with an app helped them understand how well they sight-read and made them feel more confident about their ability to sight-read as a part of the group.

The ultimate goal of the informed changes to rehearsal materials was to increase the achievement during group sight-reading activities. Over the course of the trial, the researcher used prior-year sight-reading octavos at the end of the music literacy focus of the rehearsal plan. In nearly all attempts, group reading was more consistent with regard to pitch and rhythm accuracy, with fewer perceived challenges within individual sections. While repetition of the group sight-reading process should increase achievement, students appeared to have a much better plan to work through challenges evident in the musical and harmonic material. After reviewing individual sight-reading assessment data and subgroup error trends, the instructor was able to target potential problem spots with the group during the instruction period, resulting in a much more accurate first reading.

Research Question 3

The final research question dealt with the technological challenges that emerge during assessments, and if they have a significant effect on the individual sight-reading process. Using a software application aids in the reliability of the assessment methodology, but certain challenges were experienced by students and the researcher during the study period.

Students challenges. Students were given the opportunity to evaluate the efficacy of the technology during pretest and posttest trials through surveys. While the pretest survey provided

numerical data about student perceptions, it was unclear what specific technology challenges were experienced and how those challenges affected the assessment process. The posttest survey was designed to enable an opportunity for students to comment about their challenges in a narrative form. Text responses were classified into one of four categories, including issues with the process, practice time, pitch/rhythmic concerns, and general technological issues. Early trials revealed more challenges with the actual process of the individual assessment than in later trials. The number of responses decreased over the study period, suggesting that as students became more familiar with the application, they encountered fewer problems. Most of the student reported issues were directly related to Wi-Fi connectivity issues rather than application related challenges.

Teacher challenges. Another associated time challenge with individual technology-based assessments involve the processes of software setup, including creating student accounts and classes, content creation for assessments, and development of the individual assessment trials. The process for students to create their own account was simple, but requires a moderate amount of time to complete in a group setting. An additional account was setup for the director, enrolled as a student, which enabled testing of the functionality of each assessment prior to releasing the example to students. Setup of each individual assessment within the application was relatively easy, as the melodies were prepared well in advance of the software setup. With each attempt at creating an assessment, the amount of time needed for the testing and evaluation process was reduced. The upfront time investment yields a beneficial reporting process, as student assessment reports are emailed daily, reviewable in the software by students and teachers.

During the review of data for Trial 1, the red/green markings used to indicate correct and incorrect notes did not display in reports available to the instructor after students completed their

assessments. After further investigation, the red/green notes were also not displayed to the students in real time during the trial. Following an email to Music Prodigy tech support, it was discovered that the researcher had not properly uploaded the score PNG image using the correct resolution (180 pixels per inch), which is used as a base layer over which the red and green evaluations are displayed. Also, the MusicXML file created for the first trial did not work correctly, as the single line melody did not grade male students correctly, as the program was evaluating them as singing in the incorrect octave. These issues were corrected by using Sibelius and the Preview application on a MacBook Pro to create subsequent test files, using both treble and bass clefs and an exported PNG file at the correct resolution. To test the resubmitted files with those who demonstrated challenges during the first trial, students were encouraged to retake the first trial prior to beginning the second trial. In nearly all cases, there were moderate improvements, although the reliability of the measure should be considered, as any retesting over the same material in a sight-reading exercise is essentially rehearsing the melody, because the students have been exposed to those particular patterns in the example.

Reflecting on the practice of creating both item analyses, the time factor involved in these small groups was moderate, although the application reports reflecting the red and green notes enabled a much more efficient compilation of data. Also, a more targeted review of the recordings of those who experienced trouble during the assessment was possible when using the report as a guide. The red/green note report methodology took significantly less time, although the review of the first trial with an approach using the designed coding system provided a degree more insight into the reasons for the inaccuracies of the students.

Usage of individual sight-reading assessments using technology tools provides many opportunities for achievement gains for groups by evaluating the data gathered and modifying

instruction with targeted strategies. The upfront amount of time required to develop processes for assessment creation is a moderate challenge, but should not prevent directors from including the strategy as a method for evaluating individual students on measureable tasks. The entire process of test, review, reteach, and reassess based on measurable data from individual assessments had a positive effect on entire group octavo readings, as students were more engaged in finding potential challenges in the sight-reading examples during the six-minute instruction period used during the festival sight-reading process.

Potential Significance

The potential significance of the project to the researcher's professional practice related to the impact on sight-reading assessment of the individual singer, with the long-term intent of developing pedagogical approaches to increase achievement of the overall ensemble. The benefit of the technology based assessment of sight-reading was the time savings for grading, a shortened cycle of providing meaningful instruction addressing gaps identified through individual results, and less reliance on group observations through the collection of measurable data over a period of time, ranging from a short six-week to a year-long cycle. Students also developed an increased perception of success over multiple attempts of the prompts, learning to use results from the real-time assessment to identify their own weaknesses in trouble areas.

Observation of the ensemble alone does not guarantee successful outcomes. A flaw in my assessment philosophy is that I cannot measure the understanding of individual students in these formative assessments. While the ensemble may have an appropriate sound, I cannot guarantee music literacy standards in each student. I have been reluctant to use software to measure sight-reading ability, as the programs do not account for tone fluctuations such as vibrato. It is my goal as a teacher to develop meaningful self-assessment tools, whereby students can help guide my

understanding of their knowledge of music literacy and performance practice.

Recommendations for Further Study

Recommendations for further study would include a much longer study period, such as a single grading period at the end of the school year to introduce the assessment procedures for students returning the following year. By starting the process with veteran students, the focus at the beginning of the following school year can be on students new to the program. A student transferring from a new program might use this measureable assessment procedure as an audition component derived correctly place them in an appropriate ability group, rather than placement by simply grade level. A beginning of year application of the procedures to entire ensembles would provide whole-class and sub-population data that could be used to remediate students who require additional support in rhythm or pitch training. A larger pool of study participants which are not students of the researcher should be considered. Additionally, the review of other applications and devices would be beneficial. The recent changes to instructional materials adoption procedures within Texas has allowed districts to consider technological materials in lieu of printed materials, and integration of applications such as Music Prodigy and the content offered within the program extend the potential to tie concert or sight-reading literature into immediately assessable material.

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Appendices

Appendix A – IRB Documentation

UF | Institutional Review Board
UNIVERSITY of FLORIDA

PO Box 112250
Gainesville, FL 32611-2250
352-392-0433 (Phone)
352-392-9234 (Fax)
irb2@ufl.edu

February 23, 2016

TO: Andre Clark; Richard Webb
218 Killian Loop
Hutto, TX 78634

FROM: Ira S. Fischler, PhD; Chair
University of Florida
Institutional Review Board 02

SUBJECT: **Exemption of Protocol #2016-U-0121**
Using Technology Assessment Tools to Increase Vocal Sight-Reading Achievement

SPONSOR: None

Your protocol has been reviewed by the IRB. The Board determined that your protocol is exempt based on category:

> *45 CFR 46.101(b) (1) Research conducted in established or commonly accepted educational settings, involving normal educational practices, such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.*

Should the nature of your study change or if you need to revise this protocol in any manner, please contact this office before implementing the changes.

IF:dl

Stony Point HS Choir | *sphschoir.com* | *Andre Clark, Director* *1801 Tiger Trail | Round Rock, TX 78664 | (512) 428-7182*

College of the Arts
101 Fine Arts Building A
P.O. Box 115800
University of Florida
Gainesville, FL 32611-5800

Parental Consent

Dear Parent/Guardian,

I am a graduate student in the Department of Music at the University of Florida, conducting research on sight-reading instruction. The purpose of this study is to determine how effective classroom sight-reading instruction strategies are through the use of individual student assessments. The results of the study may help music teachers better understand which approaches are most effective to ensure that students can read music accurately, and using this data, design instructional practices accordingly. These results may not directly help your child today, but may benefit future students. With your permission, I would like to ask your child to volunteer for this research.

Students participating in this study will use an iPad application, Music Prodigy, which will be used to administer a sight-reading test. The examples will be 8 measures long, and will be similar to the examples used during class in group reading. The application works similar to Guitar Hero, where the notes that the student sings correctly are marked in green, and incorrect notes are marked red. Each attempt is audio recorded by the program, which the student and I can review. Using these recordings and the data collected from the application will be used to determine how effective specific classroom instructional approaches have been in preparing students for the sight-reading process. An online evaluation will be collected following each assessment, asking students about the assessment process and how they felt about their achievement during the assessment. The assessments will take place during February and March, ending before Spring Break.

Although the children will be asked to type their names on the surveys for matching purposes, their identity will be kept confidential to the extent provided by law. We will replace their names with code numbers. Results will only be reported in the form of group data. Participation or non- participation in this study will not affect the children's grades or placement in any programs.

You and your child have the right to withdraw consent for your child's participation at any time without consequence. There are no known risks or immediate benefits to the participants. No compensation is offered for participation. Group results of this study will be available in May upon request. If you have any questions about this research protocol, please contact me at (512) 630-1535 or my faculty supervisor, Dr. William Bauer, at (352) 273-3182. Questions or concerns about your child's rights as research participant may be directed to the IRB02 office, University of Florida, Box 112250, Gainesville, FL 32611, (352) 392-0433.

Andre K Clark
Andre Clark

I have read the procedure described above. I voluntarily give my consent for my child, _____, to participate in Andre Clark's study of sight-reading assessment strategies. I have received a copy of this description.

_____	_____	_____	_____
Parent/Guardian	Date	2nd Parent/Witness	Date

Stony Point HS Choir | *sphschoir.com* | *Andre Clark, Director* *1801 Tiger Trail | Round Rock, TX 78664 | (512) 428-7182*

College of the Arts
101 Fine Arts Building A
P.O. Box 115800
University of Florida
Gainesville, FL 32611-5800

Assent Script

My name is Andre Clark, and I am pursuing a Master's Degree in Music Education at the University of Florida.

The purpose of this study is to determine how effective classroom sight-reading instruction strategies are through the use of individual student assessments.

An iPad application, Music Prodigy, will be used to administer a sight-reading tests, each of which are 8 measures long, similar to examples we use during class in group reading. The application works similar to *Guitar Hero*, where the notes sung correctly are marked in green, and incorrect notes are marked red. Each attempt is audio recorded by the program, which you can review. Following each assessment, an evaluation will be collected asking about the process and how they felt about their achievement during the assessment.

You can stop at any time, and you do not have to answer any questions.

Participation or non-participation in this study will not affect your grades.

If you are willingness to participate, please respond by saying yes or no.

Student Name _____

[ ] Yes [ ] No

Reviewed by
University of Florida
Institutional Review Board 02
Protocol # 2016-U-0121
Reviewed on : 2/22/ 2016

Sight-Reading Achievement Study

Be part of an important sight-reading research study

- Are you a 9th – 12th grade vocal student?
- Do you want to increase your sight-reading achievement scores?

If you answered YES to these questions, you may be eligible to participate in a sight-reading research study.

The purpose of this research study is to compare the effectiveness of different strategies used to increase overall sight-reading achievement. Benefits include tips and strategies to increase individual achievement scores during sight-reading assessments.

- Adolescents (13 - 19 years of age) are eligible to participate.
- Participants will not be compensated.
- No medications will be given.
- Study will be conducted during choir classes during the Spring of 2016.

This study is being conducted at:

Stony Point HS
1801 Tiger Trail
Round Rock, TX 78634

Please call Andre Clark at (512) 428-7182 for more information.

Study conducted in pursuit of a Master's Degree in Music Education at the University of Florida.

SAMPLE SOLICITATION REQUEST

From: Andre Clark

Subject: Research Request

Dear Stony Point HS Choir Student:

I am a student in the College of the Arts at the University of Florida.

Your e-mail address was obtained as your current teacher in a choir class at Stony Point High School. A blind copy format will be used so that the list of recipients will not appear in the header. The purpose of this email is to ask if you will participate in a research study.

The purpose of this study is to determine how effective classroom sight-reading instruction strategies are through the use of individual student assessments.

An iPad application, Music Prodigy, will be used to administer a sight-reading tests, each of which are 8 measures long, similar to examples we use during class in group reading. The application works similar to *Guitar Hero*, where the notes sung correctly are marked in green, and incorrect notes are marked red. Each attempt is audio recorded by the program, which you can review. Following each assessment, an evaluation will be collected asking about the process and how they felt about their achievement during the assessment.

Participation or non-participation in this study will not affect your grades.

The sight reading test will take about 5 minutes of class time, and the survey will take 3 to 5 minutes to complete. All your responses will be kept confidential. Only people directly involved with this project will have access to the surveys.

You and your parents have the right to withdraw consent for participation at any time without consequence. There are no known risks or immediate benefits to the participants. No compensation is offered for participation. Group results of this study will be available in May upon request. If you have any questions about this research protocol, please contact me at (512) 630-1535 or my faculty supervisor, Dr. William Bauer, at (352) 273-3182.

Students will need to complete an Informed Consent Form, signed by parents.

Thank you for taking the time to assist me in this research.

Andre Clark
andre.clark@ufl.edu
(512) 630-1535

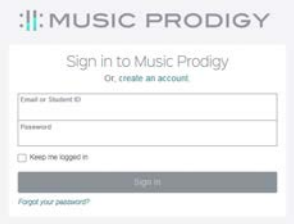
Appendix B – *Music Prodigy* Account Setup Instructions

Sight-Reading Study Account Setup

Using one of the school-provided laptops, login and open an Internet browser.

Go to http://www.MusicProdigy.com.

Click on Login, in the top right hand corner. You will be taken to a page that looks like this:



Click on Create an Account – [http://www.musicprodigy.com/mpone/register.php].

You will be taken to a webpage with a box that looks like this:

Fill in the boxes with the following information:

- In the box labeled First Name, type "Subject"
- For Last Name, use your Subject Number, as a numeral – "9"
- Use your school email address for "email address" and "Confirm Email"
- Use "choir2016" for both "Password" and "Confirm Password"
- Select "Student" for Select account type
- Do not click the box for "Keep me informed with news, tips, and more"
- Verify all the information typed in the boxes.
- Once verified, push the button for "Create Account"

On the page titled, "A Little More About You," answer the questions given.

- Select your level – "*Senior High School*"
- Select your ensemble – "*Choral/Voice*"
- In the dropdown box for "Instrument," choose *your voice part*
- Click "Continue"

You will be sent to another page, stating "Hello, this is your gradebook view. Please enroll in a class to see the class here."

In the box labeled, "Enroll in a class," enter fjy754

Congratulations! You are finished with this part of the process!

Appendix C – Plan of Instruction

Technique and Sight Reading Sequence

Vocal Technique

- Ha Ha Ha Ha Ha – 1 3 5 3 1 (start on Bb, go up an octave to C)
- Ze Aww – 1 5 4 3 2 1 (start on D, go up an octave to E)

Rhythm Sheet #3

- #7
- #8
- #9

Major Scales

- Major

Drills Based on Major Scales

- Major scale by 3rds – D M R F M S F L S T L D T R D | D L T S L F S M F R M D R T D
- Primary chord drill - D M S M D S' D | D F L F D L' D | T' R S R T' S' T' | D M S D' S M D S' D

Isolated Pitch/Interval Training

- La Si La
- So Fi So
- Re Di Re
- Mi Fi Si La

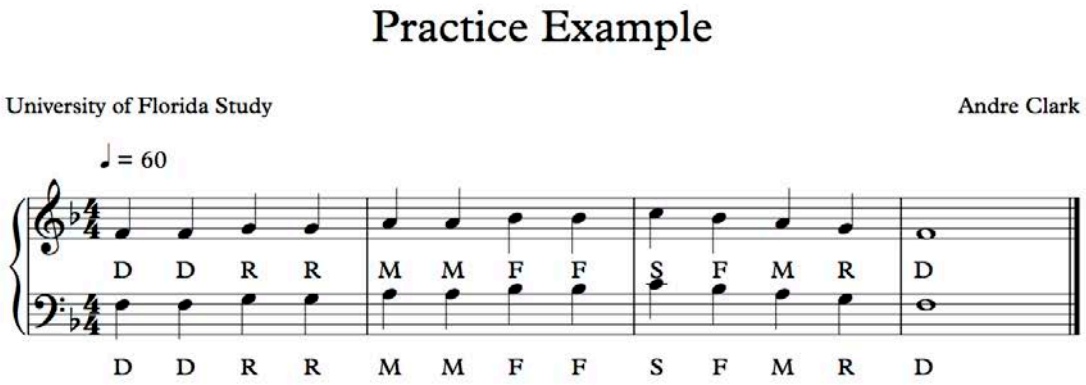
Minor Scale Drills

- Major – move to tonal center of LA
- Natural Minor
- Harmonic Minor
- Melodic Minor

Unison Sight Reading Drills

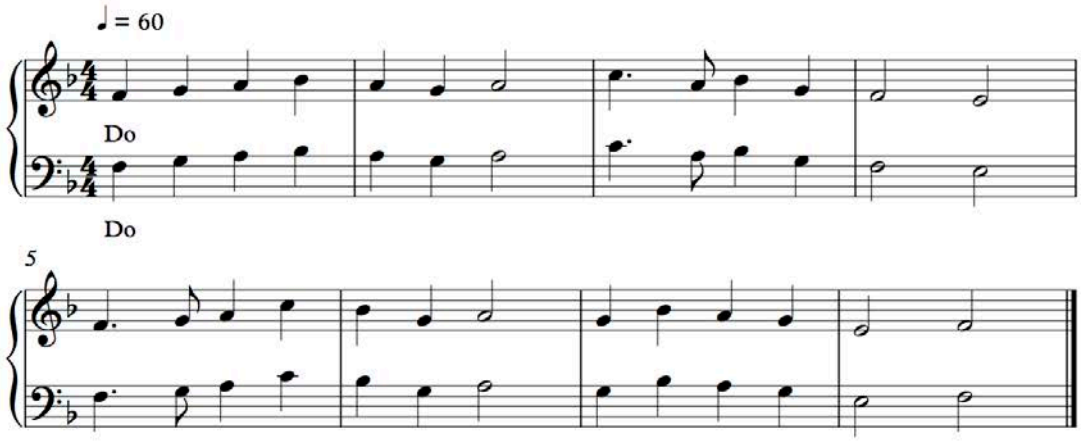
- Single measure flash cards - rotations
- 8-measure single line reading – Sight Reading Factory

Appendix D – Sight-Reading Prompts



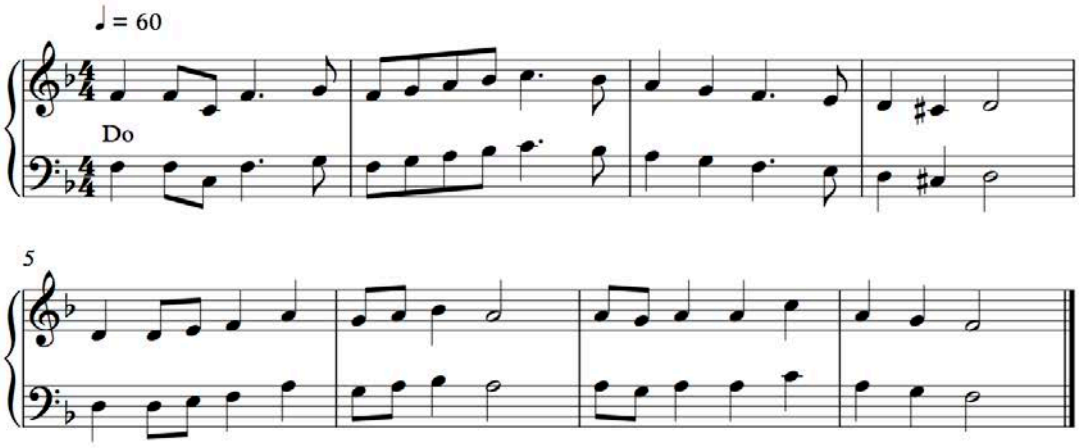
Trial #1

University of Florida Study Andre Clark

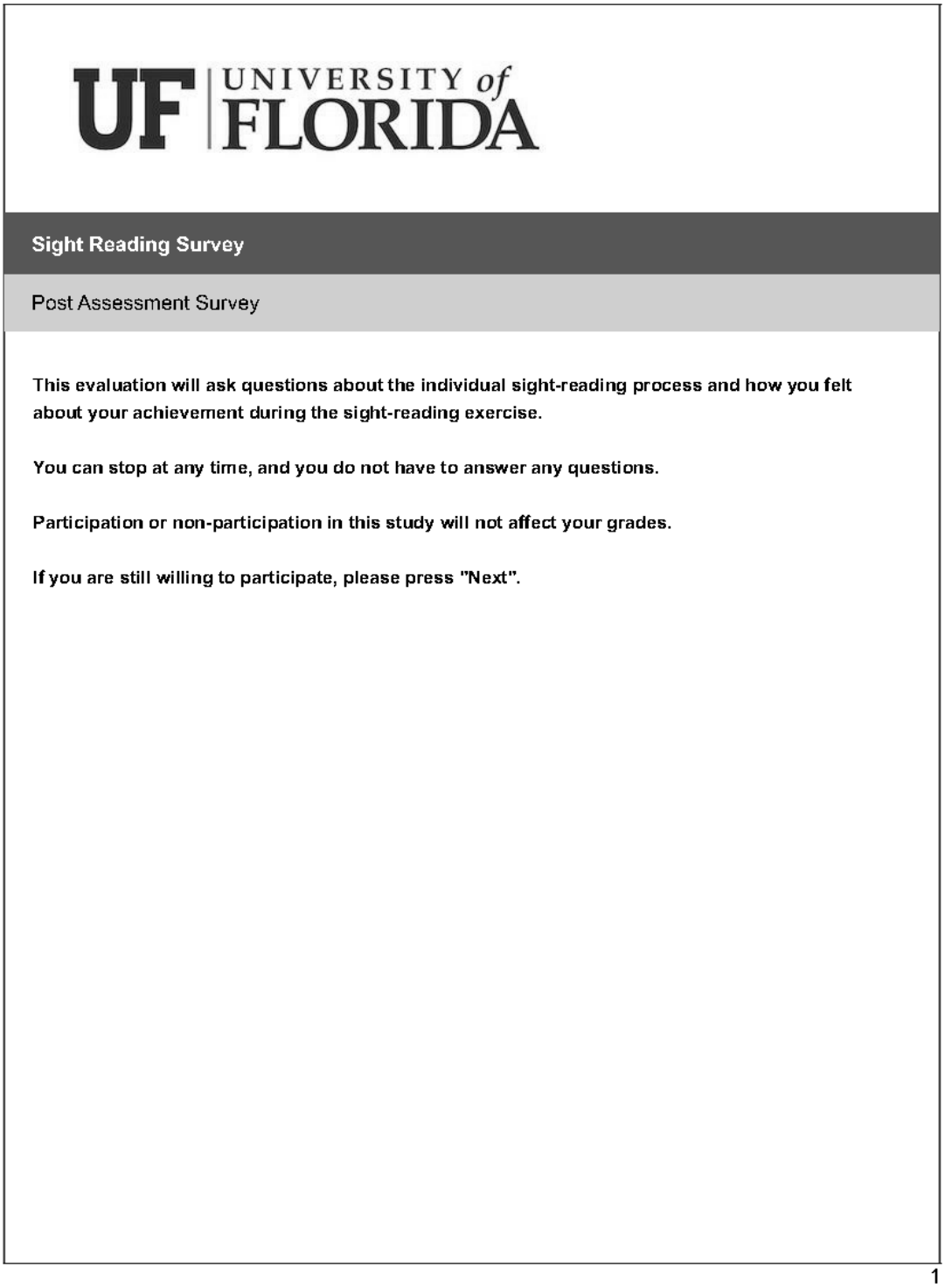


Trial #2

University of Florida Study Andre Clark



Appendix E – Online Survey #1



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Sight Reading Survey

Confidence Factors

1. How confident are you in your ability to sight-read in the following situations?

	Not confident at all, very unsure	Somewhat unsure	Neither confident or unsure	Somewhat confident	Very confident
Entire class reading, all reading same 8-measure example	○	○	○	○	○
Entire class reading, multiple part example (UIL Sight-Reading)	○	○	○	○	○
Individual sight-reading, using software application to score, with one attempt	○	○	○	○	○
Individual sight-reading, using software application to score, multiple attempts	○	○	○	○	○

2

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Sight Reading Survey

Group Sight Reading Strategies

2. How effective were the following skill building exercises in preparing you to sight-read in a group?

	Not beneficial	Did not help, did not hinder	Somewhat beneficial	Very beneficial
Rhythm reading (group counting)	○	○	○	○
Singing Scales	○	○	○	○
Singing the scale by thirds pattern (D M R F M S F L S **T** L D **T** R D)	○	○	○	○
Singing the Primary Chord Drill (D M S M D S D, D F L F D L D, **T** R S R **T** S **T**, D M S D S M D)	○	○	○	○
Singing back hand signs/intervals (director shows a sign, group sings back)	○	○	○	○
Single measure flash card drills	○	○	○	○
Entire class sight-reading a unison melody	○	○	○	○
Chanting with your section before sight-reading	○	○	○	○
Teacher identifying potential trouble spots	○	○	○	○
Silent singing (whisper singing, audiating)	○	○	○	○

3

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Sight Reading Survey

Individual Sight Reading Strategies

3. How effective were the following skill building exercises in preparing you to sight-read as an individual?

	Not beneficial	Did not help, did not hinder	Somewhat beneficial	Very beneficial
Rhythm reading (counting out loud)	○	○	○	○
Singing Scales	○	○	○	○
Singing the scale by thirds pattern (D M R F M S F L S **T** L D **T** R D)	○	○	○	○
Singing the Primary Chord Drill (D M S M D S D, D F L F D L D, **T** R S R **T** S **T**, D M S D S M D)	○	○	○	○
Silent singing (whisper singing, audiating)	○	○	○	○
Using hand signs	○	○	○	○

4

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Sight Reading Survey

Individual Sight-Reading Assessment

4. Should individual sight-reading tests be considered as a part of your overall choir grade?

- ◯ Yes
- ◯ No
- ◯ Unsure

5. Did the process of sight-reading individually with an app that provided a numerical score help you understand how well you sight-read?

- ◯ Yes
- ◯ No
- ◯ Unsure

6. Did you listen to the recording of your sight-reading assessment?

- ◯ YEs
- ◯ No

7. Did the individual sight-reading assessment make you feel more confident about your ability to sight-read as a part of the group?

- ◯ Yes
- ◯ No
- ◯ Unsure

5

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Sight Reading Survey

About you

8. Are you male or female?

- ◯ Male
- ◯ Female

9. What grade are you in?

- ◯ Freshman
- ◯ Sophomore
- ◯ Junior
- ◯ Senior
- ◯ Fifth year / Other

10. How many years of high school choir experience do you currently have? (Include this year)

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4

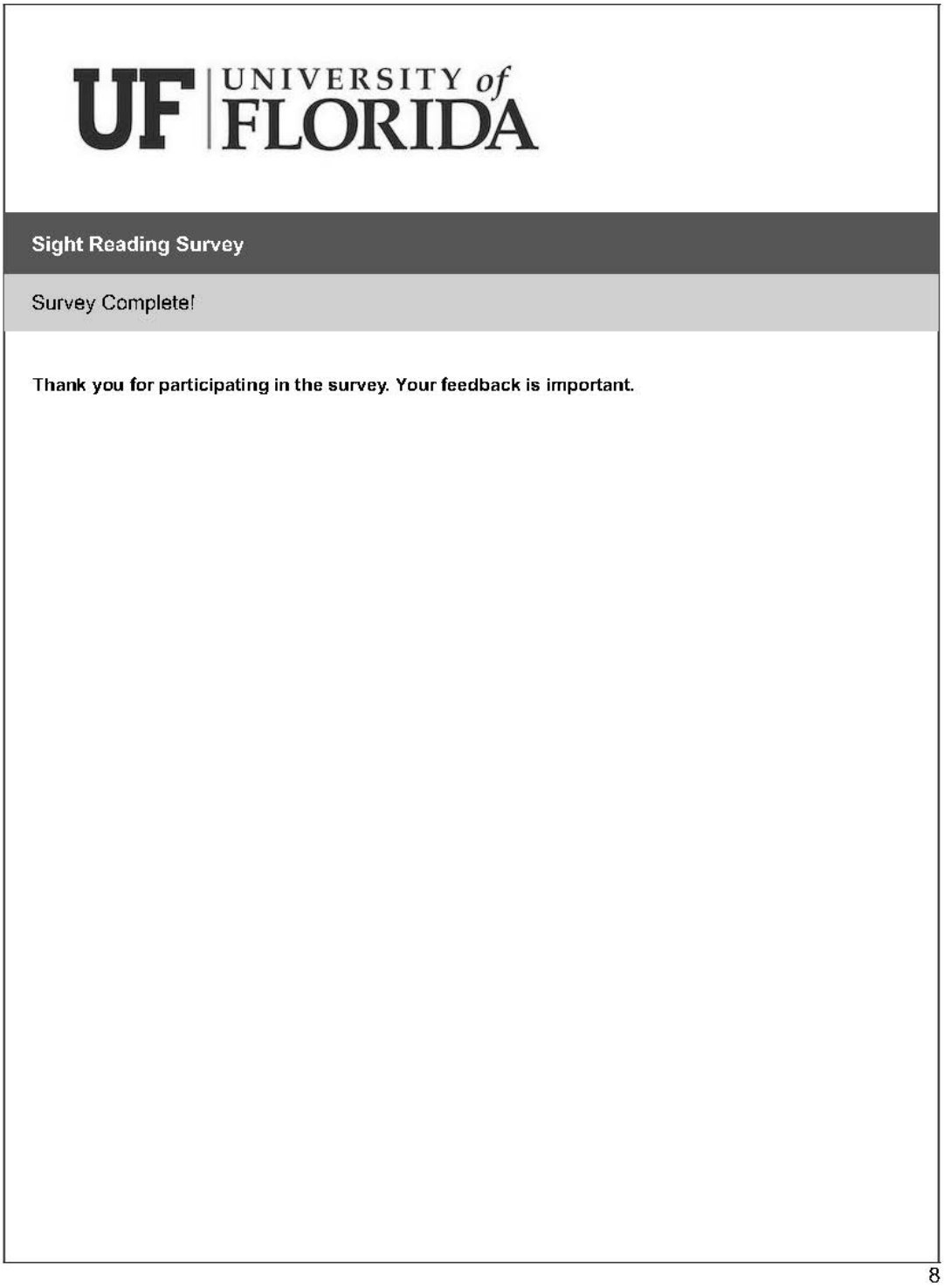
11. How many years of middle school choir experience did you have?

- ◯ 0
- ◯ 1
- ◯ 2
- ◯ 3

6

12. Which choir class period are you in?

7


UF UNIVERSITY of FLORIDA
Sight Reading Survey
Survey Complete!
Thank you for participating in the survey. Your feedback is important.
8

Appendix F – Online Survey #2

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Exit Questionnaire

Post Assessment Survey

This evaluation will ask questions about the individual sight-reading process and how you felt about your achievement during the sight-reading exercise.

You can stop at any time, and you do not have to answer any questions.

Participation or non-participation in this study will not affect your grades.

If you are still willing to participate, please press "Next".

1

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Exit Questionnaire

Confidence Factors

1. How confident are you in your ability to sight-read in the following situations?

	Not confident at all, very unsure	Somewhat unsure	Neither confident or unsure	Somewhat confident	Very confident
Entire class reading, all reading same 8-measure example	○	○	○	○	○
Entire class reading, multiple part example (UIL Sight-Reading)	○	○	○	○	○
Individual sight-reading, using software application to score, with one attempt	○	○	○	○	○
Individual sight-reading, using software application to score, multiple attempts	○	○	○	○	○

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Exit Questionnaire

Individual Sight-Reading Assessment

2. Should individual sight-reading tests be considered as a part of your overall choir grade?

- ◯ Yes
- ◯ No
- ◯ Unsure

3. Did the process of sight-reading individually with an app that provided a numerical score help you understand how well you sight-read?

- ◯ Yes
- ◯ No
- ◯ Unsure

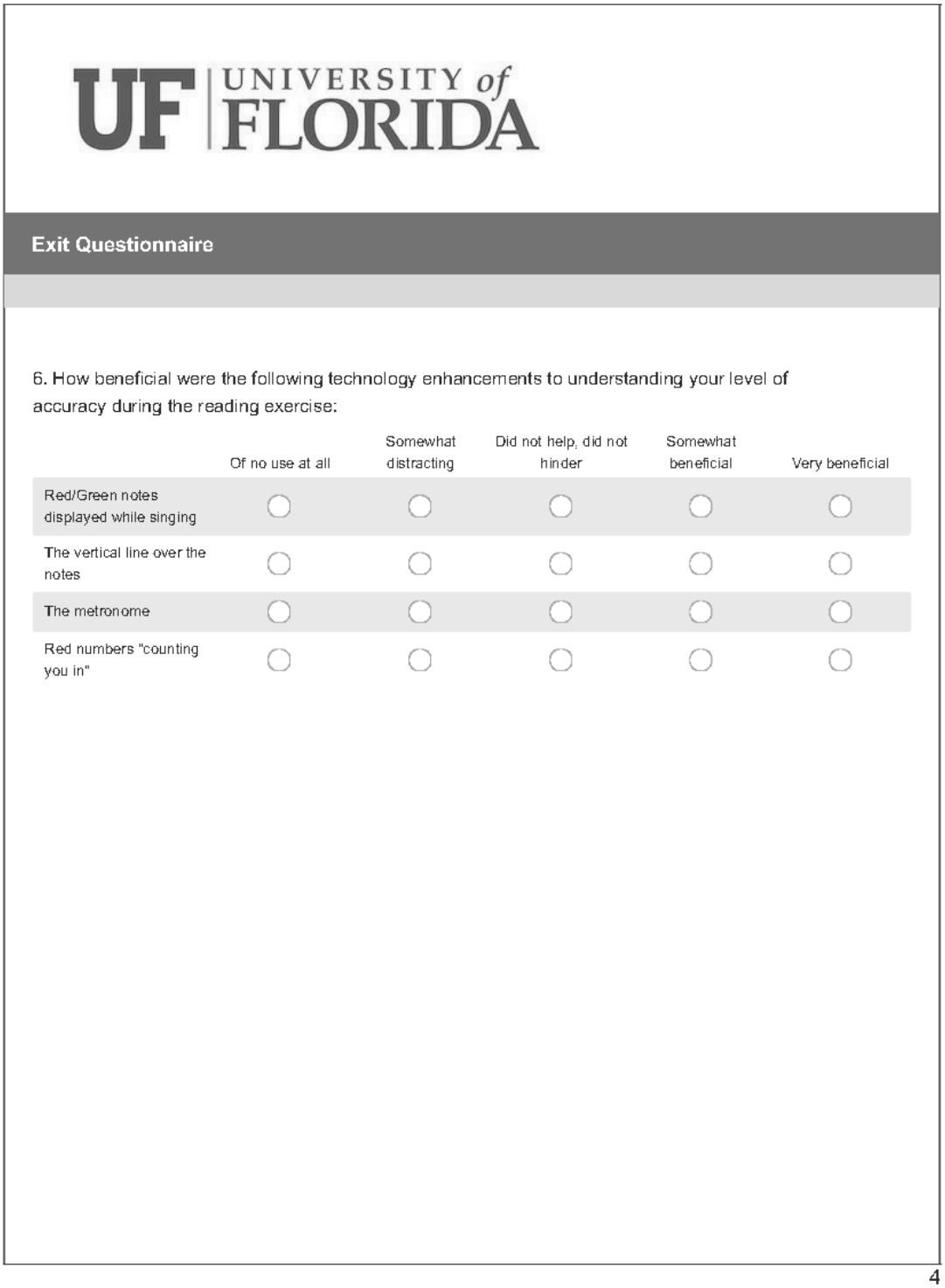
4. Did you listen to the recording of your sight-reading assessment?

- ◯ Yes
- ◯ No

5. Did the individual sight-reading assessment make you feel more confident about your ability to sight-read as a part of the group?

- ◯ Yes
- ◯ No
- ◯ Unsure

3



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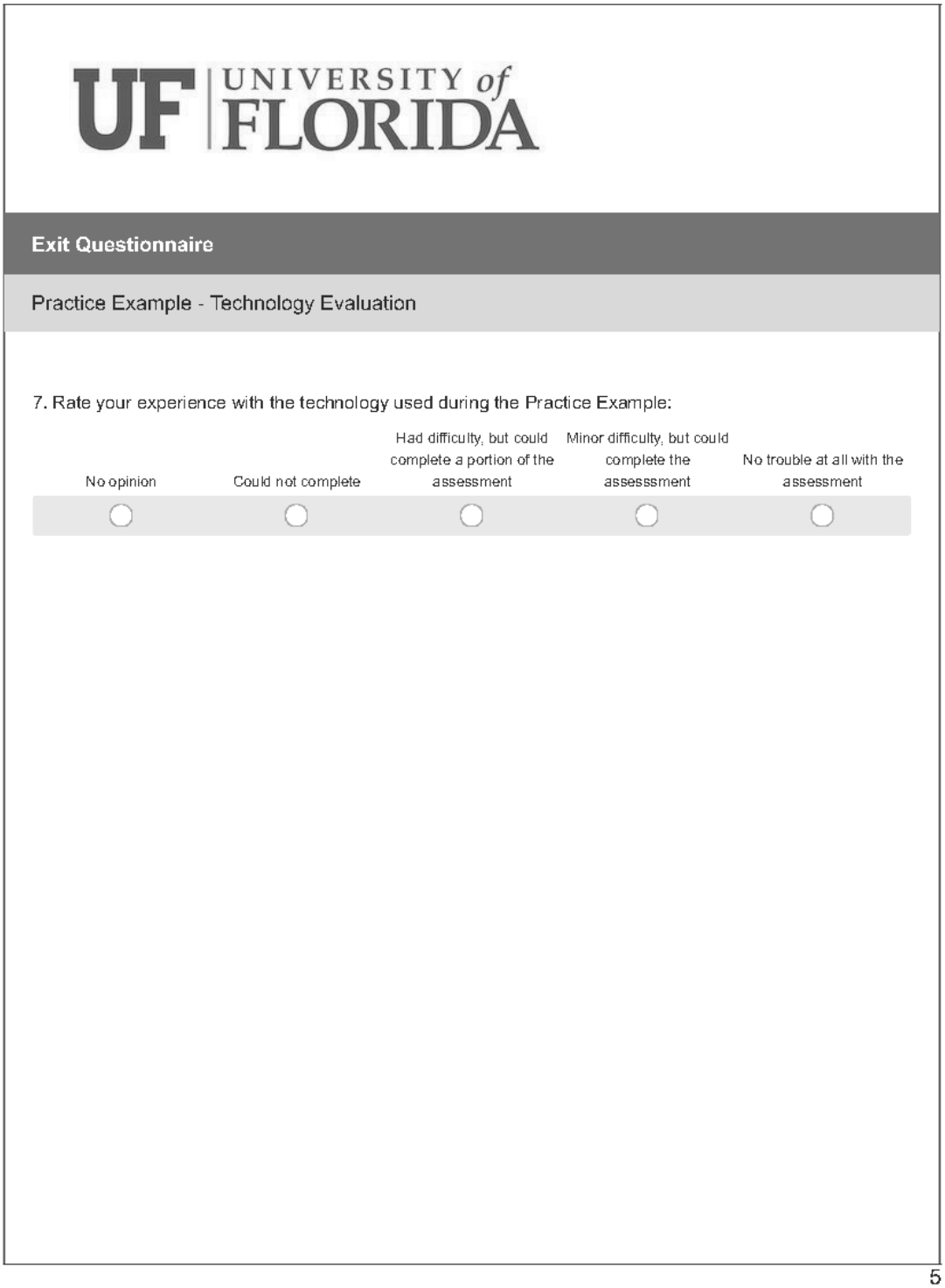
Exit Questionnaire

6. How beneficial were the following technology enhancements to understanding your level of accuracy during the reading exercise:

	Of no use at all	Somewhat distracting	Did not help, did not hinder	Somewhat beneficial	Very beneficial
Red/Green notes displayed while singing	○	○	○	○	○
The vertical line over the notes	○	○	○	○	○
The metronome	○	○	○	○	○
Red numbers "counting you in"	○	○	○	○	○

4


UF UNIVERSITY of FLORIDA
Exit Questionnaire
Practice Example - Technology Evaluation
7. Rate your experience with the technology used during the Practice Example:
No opinion
Could not complete
Had difficulty, but could complete a portion of the assessment
Minor difficulty, but could complete the assesssment
No trouble at all with the assessment
5

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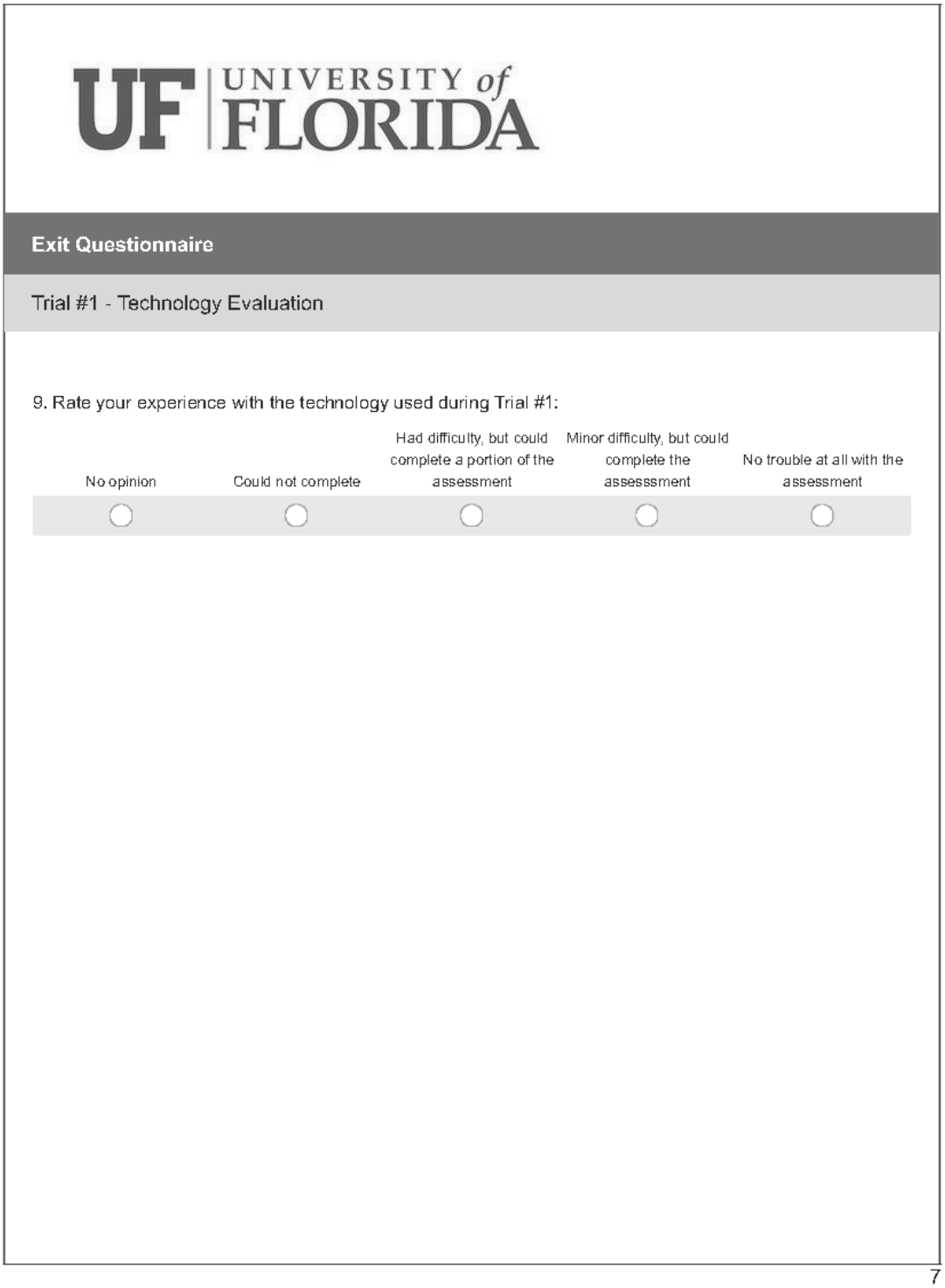
Exit Questionnaire

Practice Example - Technology Evaluation - Discussion

8. Briefly describe the challenges with the technology you experienced during the Practice Example

6



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Exit Questionnaire

Trial #1 - Technology Evaluation

9. Rate your experience with the technology used during Trial #1:

No opinion	Could not complete	Had difficulty, but could complete a portion of the assessment	Minor difficulty, but could complete the assesssment	No trouble at all with the assessment
○	○	○	○	○

7

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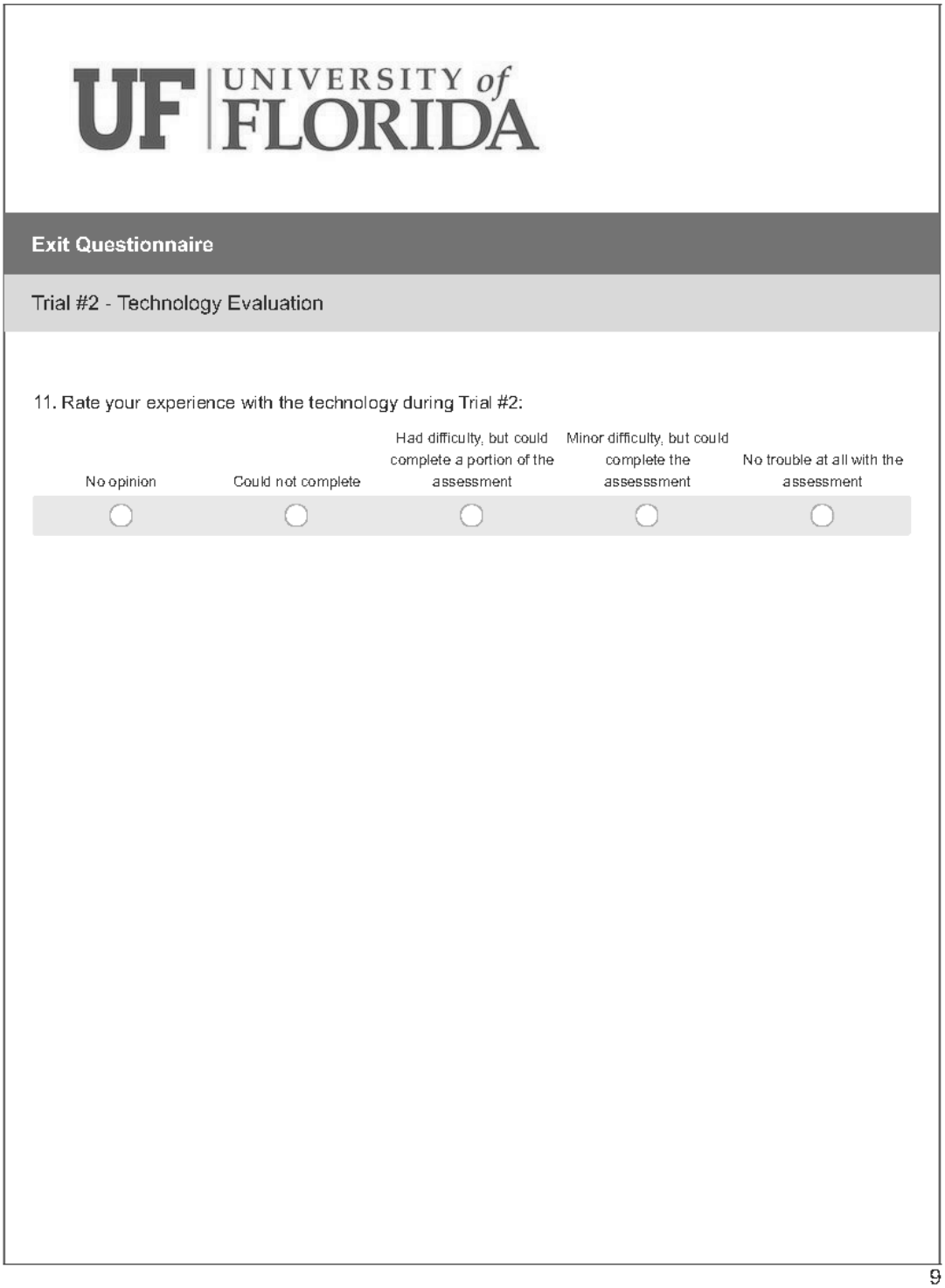
Exit Questionnaire

Trial #1 - Technology Evaluation - Discussion

10. Briefly describe the challenges with the technology you experienced during Trial #1

8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Exit Questionnaire

Trial #2 - Technology Evaluation

11. Rate your experience with the technology during Trial #2:

No opinion	Could not complete	Had difficulty, but could complete a portion of the assessment	Minor difficulty, but could complete the assesssment	No trouble at all with the assessment
○	○	○	○	○

9

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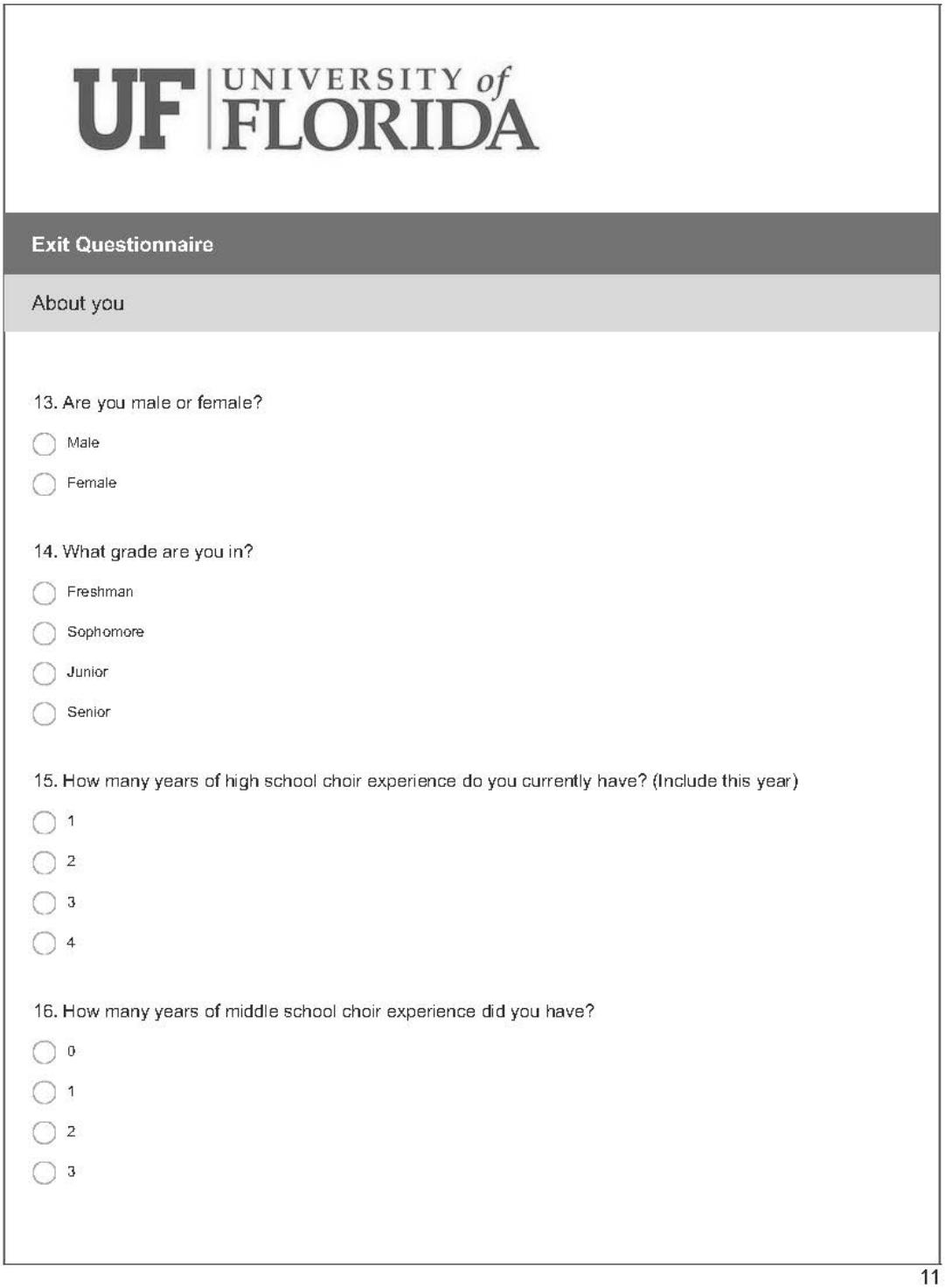
Exit Questionnaire

Trial #2 - Technology Evaluation - Discussion

12. Briefly describe the challenges with the technology you experienced during Trial #2

10



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Exit Questionnaire

About you

13. Are you male or female?

- ◯ Male
- ◯ Female

14. What grade are you in?

- ◯ Freshman
- ◯ Sophomore
- ◯ Junior
- ◯ Senior

15. How many years of high school choir experience do you currently have? (Include this year)

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4

16. How many years of middle school choir experience did you have?

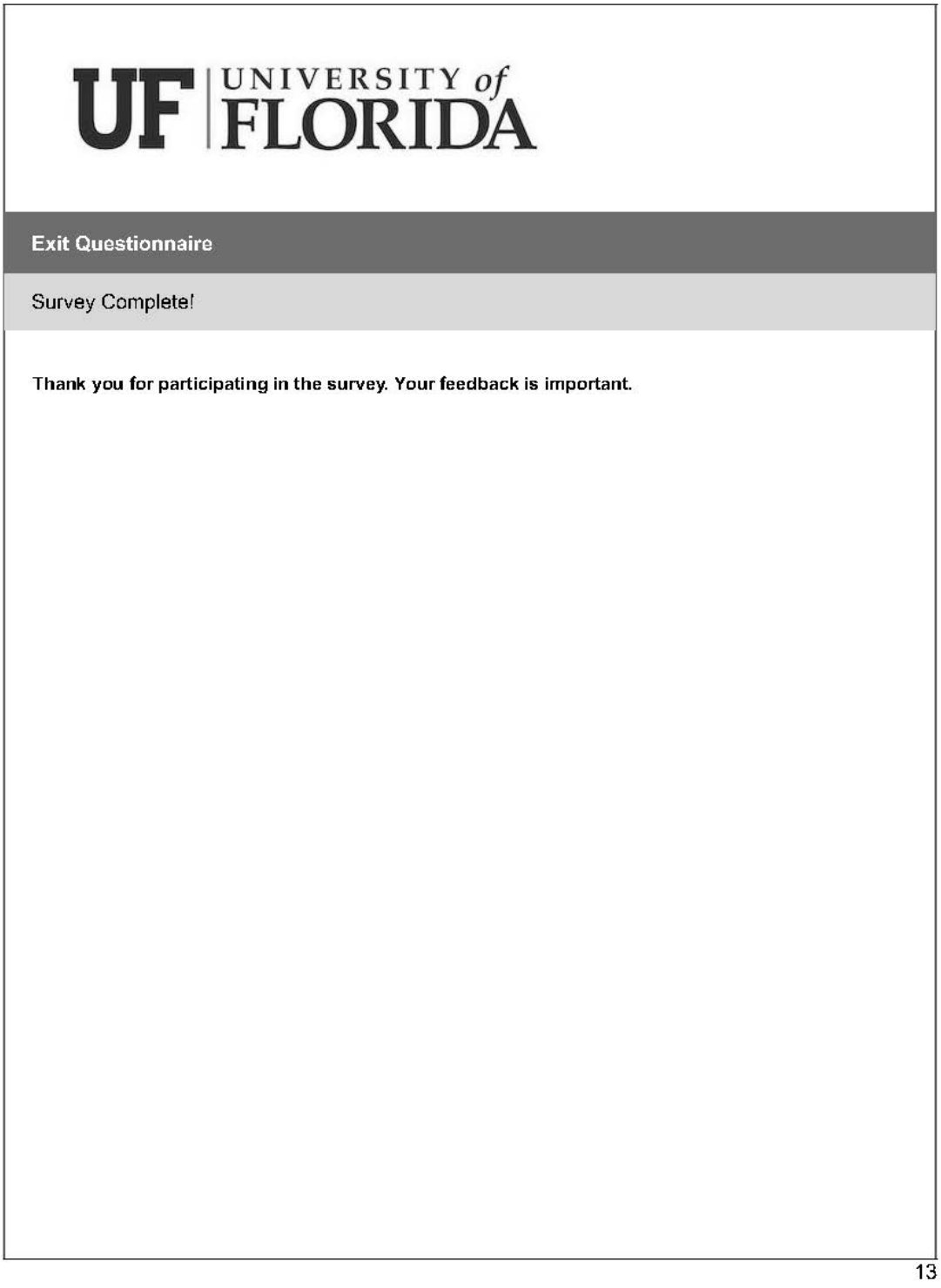
- ◯ 0
- ◯ 1
- ◯ 2
- ◯ 3

11

17. Which choir class period are you in?

18. What is your student ID number?

12


UF UNIVERSITY of FLORIDA
Exit Questionnaire
Survey Complete!
Thank you for participating in the survey. Your feedback is important.
13

Appendix G – Sample *Music Prodigy* Report

MUSIC PRODIGY

Performance Report

Course: **University of Florida Study > Trial 2**
Title: **Individual Assessment #2**

Student: **Subject 12**
Date: **Friday, 1st of April 2016**
Time: **17:35:19 CDT**

Score: **94%**
Correct Notes: **33 of 35**

Assignment details:

TITLE: Trial 2

CONTEXT: University of Florida Study > Trial 2

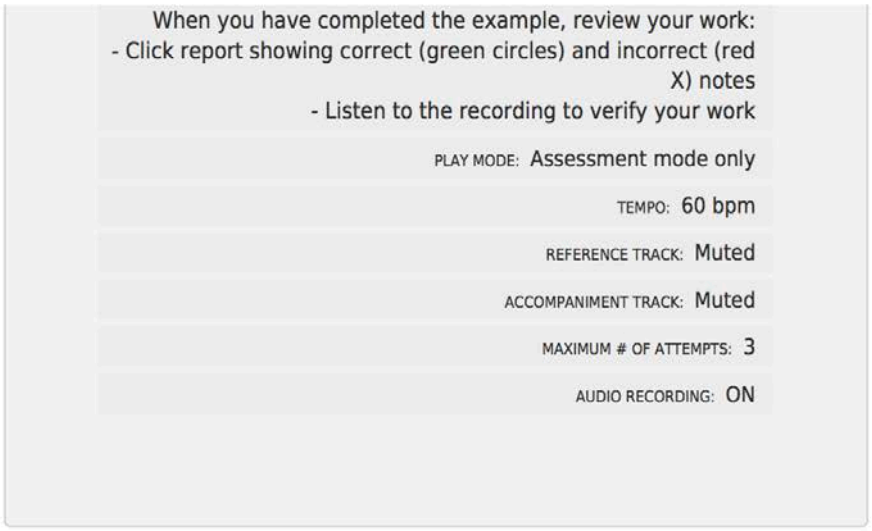
DUE DATE: Friday, 15th of April 2016 12:00 AM

MINIMUM VALID SCORE: 70%

INSTRUCTIONS: Take approximately 30 seconds to study the example. Use some or all of the strategies we use during group sight-reading time, including:
- singing out loud OR audiating
- hand sign
- use drills from warmup
- major scale patterns
- scales by thirds patterns
- minor scale patterns
- primary chord drill

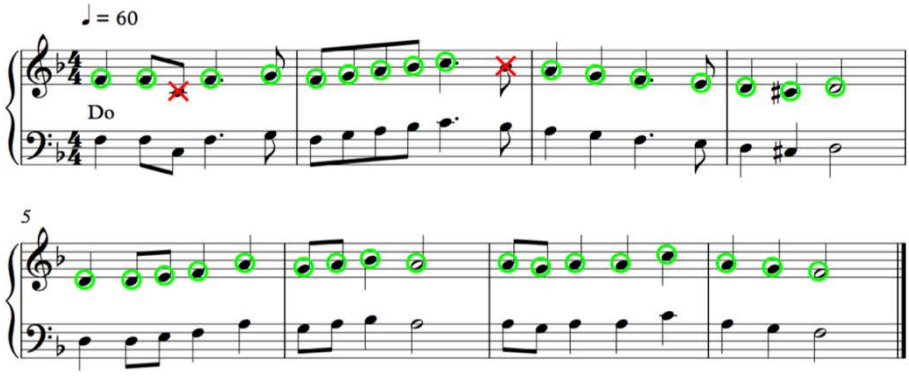
After the 30-second study period, click on the > sign to begin. The software will then:
- Play your starting pitch
- set the tempo (four clicks)
- count you in (numbers in the center)

Sing the notes using the defined tempo to the best of your ability. Use the following strategies to assist you as you read:
- Red notes are incorrect - adjust pitch
- Green notes are in tune
- The cursor will guide your eye


When you have completed the example, review your work:
- Click report showing correct (green circles) and incorrect (red X) notes
- Listen to the recording to verify your work
PLAY MODE: Assessment mode only
TEMPO: 60 bpm
REFERENCE TRACK: Muted
ACCOMPANIMENT TRACK: Muted
MAXIMUM # OF ATTEMPTS: 3
AUDIO RECORDING: ON

Trial #2

University of Florida Study Andre Clark



Appendix H – Item Analysis, Trials 1 and 2

Trial #1																																
Item Analysis			D	R	M	F	M	R	M	S	M	F	R	D	T	D	R	M	S	F	R	M	R	F	M	R	T	D				
		% Missed	15%	17%	17%	24%	15%	22%	22%	24%	37%	32%	32%	20%	15%	24%	24%	24%	32%	29%	32%	27%	37%	34%	29%	24%	37%	27%				
Subject	Score	Misses	6	7	7	10	6	9	9	10	15	13	13	8	6	10	10	10	13	12	13	11	15	14	12	10	15	11				
1	100																															
2	81	5											p							p	p			p			p					
3	100																															
4	96	1																									r					
5	65	9																	p	p		p	p	p	p	p	p	p				
6	96	1								p																						
7	96	1																	p													
8	31	18				r				b	b	b	b			b	b	b	b	b	b	b	b	b	b	b	b	b				
9	dropped																															
10	85	4									p	p									p	p										
11	92	2								p														p								
12	96	1																									p					
13	42	15		r	r	r					b	b	b	b		b	b	b	b				r		r	r	r					
14	92	2									r												p									
15	100																															
16	81	5						r	r		b	b																p				
17	88	3										b	b														r					
18	dropped																															
19	31	18	p	p	p	p		p	p		b	b	b	b	b	b	b	b		b	b	b	b									
20	100																															
21	46	14									b					r	r	r	r	r	r	r	b	b	b	b	b	b				
22	88	3								r													p		p							
23	92	2				t					t																					
24	96	1											p																			
25	dropped																															
26	81	5									p	p								p	p	p										
27	85	4						r	r												r			p								
28	dropped																															
29	85	4																	p	b	b			p								
30	100																															
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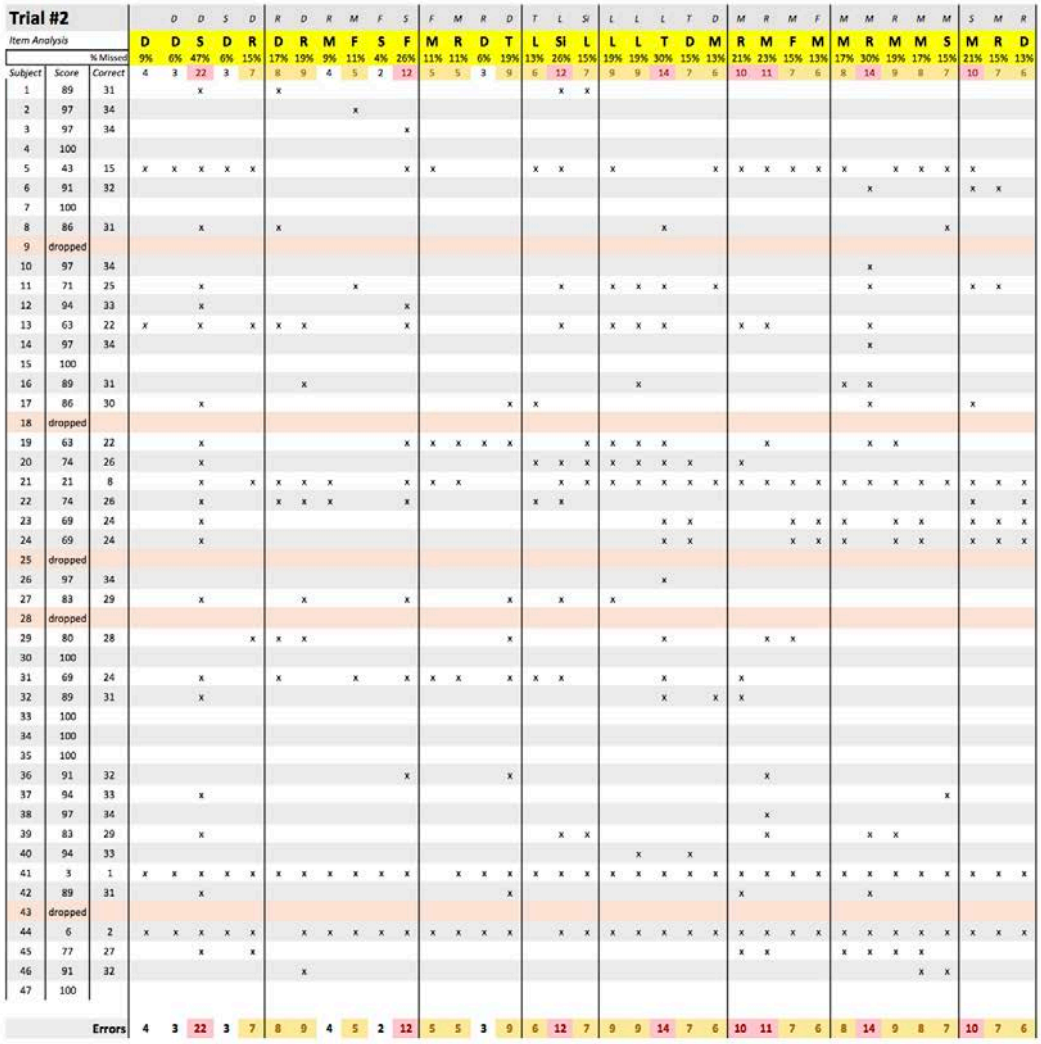
32	96	1										p																				
33	100																															
34	100																															
35	100																															
36	96	1									p																					
37	88	3								p			p						p													
38	96	1																										p				
39	92	2																					p		p							
40	100																															
41	27	19	p	p	p	p	p	p	p				r	p		p	b	b	r				b	b	b	b	b	b				
42	96	1																									p					
43	dropped																															
44	35																															
45	92	2																					p	p								
46	100																															
47	100																															
		Errors	2	3	3	5	2	5	5	6	10	9	9	4	2	6	6	6	9	8	9	7	11	10	8	6	11	7				
		Pitch	2	2	2	2	1	2	2	3	3	3	3	1		1			4	3	3	3	5	6	3	1	4	3				
		Rhythm		1	1	3	1	3	3	1	1		1			1	1	1	2	1	2	1	1		1	1	3					
		Both								2	6	6	5	3	2	4	5	5	3	4	4	3	5	4	4	4	4	4				



Trial #2																																						
			D	D	S	D	R	D	R	M	F	S	F	M	R	D	T	L	Si	L	L	L	T	D	M	R	M	F	M	M	R	M	M	S	M	R	D
Item Analysis			D	D	S	D	R	D	R	M	F	S	F	M	R	D	T	L	Si	L	L	L	T	D	M	R	M	F	M	M	R	M	M	S	M	R	D
		% Missed	9%	6%	47%	6%	15%	17%	19%	9%	11%	4%	26%	11%	11%	6%	19%	13%	26%	15%	19%	19%	30%	15%	13%	21%	23%	15%	13%	17%	30%	19%	17%	15%	21%	15%	13%
Subject	Score	Correct	4	3	22	3	7	8	9	4	5	2	12	5	5	3	9	6	12	7	9	9	14	7	6	10	11	7	6	8	14	9	8	7	10	7	6
1	89	31			x			x											x	x																		
2	97	34									x																											
3	97	34											x																									
4	100																																					
5	43	15	x	x	x	x	x						x	x				x	x		x			x		x	x	x	x	x		x	x	x	x	x		
6	91	32																													x				x	x		
7	100																																					
8	86	31			x			x															x											x				
9	dropped																																					
10	97	34																													x							
11	71	25			x						x								x		x	x	x		x						x				x	x		
12	94	33			x								x																									
13	63	22	x		x		x	x	x				x						x		x	x	x			x	x				x							
14	97	34																													x							
15	100																																					
16	89	31							x													x								x	x						
17	86	30			x												x	x													x				x			
18	dropped																																					
19	63	22			x								x	x	x	x	x			x	x	x	x				x				x	x						
20	74	26			x													x	x	x	x	x	x	x		x												
21	21	8			x		x	x	x	x			x	x	x				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
22	74	26			x			x	x	x			x					x	x																	x		x
23	69	24			x																		x	x				x	x	x		x	x			x	x	x
24	69	24			x																		x	x				x	x	x		x	x			x	x	x
25	dropped																																					
26	97	34																					x															
27	83	29			x				x				x				x		x		x															x		
28	dropped																																					
29	80	28					x	x	x								x						x				x	x										
30	100																																					
31	69	24			x			x			x		x	x			x	x	x				x			x												
32	89	31			x																		x		x	x												
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37	94	33			x																													x				
38	97	34																									x											
39	83	29			x														x	x							x				x	x						
40	94	33																				x		x														
41	3	1	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
42	89	31			x												x									x					x							
43	dropped																																					
44	6	2	x	x	x	x	x		x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
45	77	27			x		x																			x	x			x	x	x	x					
46	91	32							x																								x	x					
47	100																																					
		Errors	4	3	22	3	7	8	9	4	5	2	12	5	5	3	9	6	12	7	9	9	14	7	6	10	11	7	6	8	14	9	8	7	10	7	6