

Student Perception of the Effectiveness of SmartMusic as a Practice and Assessment  
Tool on Middle School and High School Band Students

by

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A Thesis

In

MUSIC EDUCATION

Submitted to the Graduate Faculty  
of Texas Tech University in  
Partial Fulfillment of  
the Requirements for  
the Degree of

MASTER OF MUSIC

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May, 2012

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## **Abstract**

As new technology is developed more opportunities to enrich the music education classroom exist. The purpose of this study was to examine the effectiveness of the SmartMusic practice and assessment software with middle school and high school band students and to compare and analyze their perceptions of the effectiveness of the program. Participants of this study were band students ( $N = 147$ ) in grades 6 through 12 in a small West Texas public school.

Data in this study were gathered by asking all participants to complete a survey consisting of eleven separate prompts. The survey prompts were answered using a 5-point Likert scale and were designed to solicit the students' perceptions of the effectiveness of the SmartMusic program. Somewhat in agreement with earlier investigations, the results indicated that the SmartMusic program did increase motivation to practice in younger students. Importantly, findings in this study showed a significant increase in student self-assessment with all groups of student participants regardless of age or experience level.

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## **Chapter I**

### **Justification**

As technology becomes more readily available to both the teacher and the student, do we not owe it to our students to investigate every technological tool available to increase our effectiveness in reaching the student? Both students and teachers have greater access to computers than ever before, and the expansion of the Internet makes available some very powerful tools as well as a wide array of information. It is essential that the effectiveness of each tool must be measured so that accurate curricular objectives and expectations can be designed and implemented. The purpose of this study is to examine the effectiveness of the SmartMusic practice and assessment software with middle school and high school band students and to compare and analyze their perceptions of the effectiveness of the program. The resulting data will be discussed to assist in future curricular planning using this software tool.

### **Parameters**

For the purposes of this study, the following parameters are set:

Subject Groups: HS Band refers to the high school band taught daily by the researcher. The group consists of students in grades 9-12 that meet in a regularly scheduled 45 minute class period daily. Students in this group have each been playing their instruments for 5-8 years, and have been using the SmartMusic program as a practice and assessment tool in the normal curriculum for a minimum of three years. MS Band refers to the middle school band taught daily by the researcher. This group consists

of students in grades 7-8 that meet in a regularly scheduled 45 minute class period daily. Students in the MS Band group have been playing their instruments for 3-4 years, and have each been using the SmartMusic program in a similar manner to the HS Band, but only for 2-3 years. Sixth Grade Band refers to the sixth grade band taught daily by the researcher and the researcher's assistant director. Students in this group have been playing their instruments for two years, and have been using the SmartMusic program for 1 year.

Hardware and Software: All computers used in this study are Dell PCs owned by the researcher's school district. All CPUs are using the Windows XP Professional operating system, and all are running the 2012 version of the SmartMusic software, with the most current updates always applied. Identical Blue Snowball external USB microphones are used on all school PCs. There are six such workstations available for use by the participants of this study, all in separate rooms removed but adjacent to the main rehearsal room. Students all have unique login usernames and passwords to both the computer operating systems and the SmartMusic system. This allows each student to use the program's interactive online features, such as assessment and time tracking.

Assessments for each class are designated by the teacher through the SmartMusic program and accessed by the student using the login procedure. The online SmartMusic repertoire library contains a wide variety of materials which includes both pre-written exercises and ensemble literature. Any of these materials may be chosen and assigned to the student. The instructor also has the option to compose materials using the Finale music notation software and convert it to SmartMusic format for assignment through the system. Students are required to submit their performance by a due date set for each



assignment. Students may attempt the assignment as many times as they wish to achieve the performance quality and resulting assessment score that they are satisfied with within the allotted time.

In terms of daily procedures, as students enter the room, they have the opportunity to sign up on a marker board to set an order of use for each workstation during that class period. Once the group warm-up and announcements have been made at the beginning of class, students are allowed to enter the SmartMusic workstations in the order in which they signed up. Students are allowed ten minutes to work with SmartMusic, at which time they must return to the full band rehearsal and allow the next student in line to access the workstation. During their ten minutes, they may work on assignments from the teacher or any other music they choose from the SmartMusic library.

### **Limitations**

Participants in this study are limited to using the SmartMusic program for a maximum of ten minutes during their class period. In addition, they may use the program on the school provided PCs as much as they wish during the time before school, their lunch break, or after school. Their available time is occasionally limited by the response time of the program through the Internet to download the required assignments or accompaniments. This response time varies due to factors outside the control of the researcher, such as limits of available bandwidth.

## **Chapter II**

### **Review of Related Research**

#### **Technology in the Music Classroom**

Technology is an ever-changing field, and as such presents difficulties to the educator in prioritizing which technological tools to employ. As new hardware is developed, software evolves to take advantage of the capabilities of the new hardware. This leads the educator into a marketplace where more educational technology aids are available than ever before (Rudolph, 2007).

Emerging in the field is the number of technology aids available that do not require any specialized equipment other than the basic computer with Internet access. Examples of such tools are YouTube, Charms music office assistant, Ricci Adam's Musictheory.net or other Internet-based programs. Kuzmich (2008) outlines newly available Internet-based programs designed to increase student learning outside the classroom. YouTube provides a unique opportunity to the educator for cross-media integration within the classroom as multiple examples not readily available before (Webb, 2007). Educators can also utilize podcasting as an effective tool to deliver information in a manner that increases student motivation and offers time-shifted learning opportunities not possible any other way. The podcasts can be used to deliver any manner of lesson, be it instrumental pedagogy, ear training, or music appreciation. The video podcasting possibilities are almost endless, with the learner able to view the lesson at their own convenience (Cooper, 2009).

As a tool, technology-based teaching aids can augment and aid in delivery of a lesson, and multiple media types complement and enrich the learning environment. However, the effectiveness will only be as good as the design of the lesson (Kozma, 1991). Benefiting multiple types of learners, teachers show a change in delivery strategies and methods when using technology applications (Levin, 2006). This study also showed significant changes in educational beliefs, particularly with teachers showing multiple views of a lesson rather than rigid classroom practice.

### **Professional Development**

Teachers must, however, be given the proper professional development to effectively model the multiple applications available through technology. Mills and Tincher (2003) have developed a model of technology integration to evaluate the integration of technology in the classroom. They believe teachers must be trained sufficiently as to create a comfort level with the technology at a level conducive to modeling in the classroom the multiple applications possible. This comfort level can be achieved through specific training and frequency of use (Bauer, 2003). An example of this idea in practice, schools in Hong Kong executed a plan to foster growth and integration of music technology in the secondary classroom over a period of five years (Ho, 2004). Results show that student motivation and quality of learning was enhanced, however the technology must be properly planned, designed, and integrated and cannot replace live instruction. It is possible, however, that this issue could become less of a problem in the future. As technological devices and Internet usage becomes more

integrated into the daily lives of the student and the teacher, training need could diminish (Dye, 2007).

### **The SmartMusic Program**

The SmartMusic program is developed and produced by the MakeMusic Corporation based in Eden Prairie Minnesota. Originally created and marketed under the name Vivace in the 1990s, it has evolved from a hardware-based data collection costing thousands of dollars to an online data library and practice tool costing \$36 a year. SmartMusic is installed software compatible with both Macintosh and PC systems. The program is subscription based, with a subscription allowing the user access to the program's repertoire library containing ensemble works, method books, solo accompaniments, and skill-building exercises. The online interactive nature of the program allows the teacher to assign exercises to the students for them to submit for assessment and feedback. Students are then able to share their recorded and stored efforts electronically with anyone (Rudolph, 2006).

The SmartMusic program has multiple features which include allowing the student to manipulate the tempo of the music, transpose, set practice loops, play the performer's part, play the accompaniment, and/or play with a click track. Practice tools provided include a metronome and a tuner, which can be activated at any time through the program. Upon completion of the exercise, the student is given the option to listen to their performance, keep or discard the performance, or export the recording to mp3 format. Additionally, the program includes a feature that will display a fingering chart for

the note the student clicks on with the mouse. If the note was performed incorrectly, the program will display the fingering chart of the note performed (Rudolph, 2006).

The SmartMusic program contains the option to provide the student instant feedback in the form of assessment of accuracy. Once performed, the exercise is assessed with correct notes showing green and incorrect notes showing red. The program will also give the student a grade based on the percentage of correct notes played. The student has the option to continue working on the exercise or submit the exercise and grade to the teacher (Rudolph, 2006).

Once submitted, the teacher may also elect to access the exercise through the SmartMusic program's grade book online or through the program itself. The teacher may see a screenshot of the student's performance, hear a recording, and/or see the grade assigned by the program. Depending on the instructor choices in designing the individual assignment, the teacher may assign a grade as well, provide feedback to the student through a comments box, or re-assign the exercise to the student (Rudolph, 2006).

Assignments may be designed from any music in the SmartMusic repertoire library or teacher-created exercises using the Finale notation software. The repertoire library is continuously updated to include new ensemble works as well as older works not included initially. The program also includes an intelligent accompaniment feature, in which the program will play a solo accompaniment and to some degree follow the expressive performance of the performer (Rudolph, 2006).

## **Prior SmartMusic Research**

There have been earlier examinations of the effectiveness of the use of SmartMusic in music education settings. Sheldon et al. (1999) measured the differences in performance-quality ratings of college-age instrumentalists performing on secondary instruments playing solo literature using live keyboard accompaniment, intelligent digital accompaniment, and no accompaniment. Participants reported that while their performance did not improve using the digital accompaniment, they did feel more motivated to practice using that system. In another study examining the program's effectiveness, Hamann (1991) discovered significant mean differences regarding students' time spent rehearsing with an accompanist when preparing for solo and ensemble festivals. In a third study, students showed improvement in performance ratings after practicing with the Vivace accompaniment program, a precursor to SmartMusic (Ouren, 1997). Of notable significance, this study showed particular improvements in the areas of rhythm and interpretation/musicianship.

Students show a need for more structure to their individual practice sessions (Maynard, 2002) as they compare to teacher-centered sessions. McKown and Cavitt (2008) used the SmartMusic program to measure the self-evaluation skills of three groups of seventh to ninth grade band students. In this examination, students were asked to perform a simple etude, and rate their performance. As treatment, one group of students performed the etude, assigned a self-evaluative numerical score, and then received feedback by means of the graphical assessment and quantitative score assigned through the assessment feature of the SmartMusic program for comparison to their own evaluation. The second group performed the etude, listened to the recording made by the

SmartMusic program of their performance, and were asked to assign a self-evaluation score. The third group performed, listened to their recorded performance, assigned a self-evaluation score, and then received the same assessment feedback as the first group to compare to their own evaluation. As a post-test, the students performed the etude three more times, each time evaluating their own performance. Results were not statistically significant but showed gains in self-assessment ability for Group 1 and Group 3, the groups provided the benefit of using the feedback from the SmartMusic program. As McKown and Cavitt (2008) have shown, the SmartMusic program can be an effective tool to increase various musical skills, yet none have examined the learner's satisfaction upon using the program.

## **Chapter III**

### **Procedure**

The purpose of this study is to examine the effectiveness of the SmartMusic practice and assessment software with middle school and high school band students and to compare and analyze their perceptions of the effectiveness of the program. As outlined by Yin (2003), this procedure adequately fits the necessary conditions for a case study: 1) the survey prompts measured student perceptions, 2) the researcher had no control of the student perceptions, and 3) the study investigated the current curriculum design.

### **Participants**

Participants of this study are band students ( $N = 147$ ) in grades 6 through 12 in a small West Texas public school. Total enrollment for this school district for the 2011 – 2012 school year is 961, with 278 students in the grade 5-8 middle school and 309 students in the grade 9-12 high school. During the 2010 – 2011 school year, the student population included 57.3% Anglo students, 42.0% Hispanic students, and 0.7% students of other races. 40.3% of the student population was considered economically disadvantaged, with 7.8% receiving Special Education services and 4.8% receiving Gifted and Talented services. The Texas Education Agency accountability rating for this district for the 2010 – 2011 school year was “Recognized,” the second highest rating possible (Texas Education Agency, 2011).

Students that elect enrollment in band are divided into three separate band classes: sixth grade band ( $n = 39$ ), 7<sup>th</sup>/8<sup>th</sup> grade middle school band ( $n = 45$ ), and a high school



band ( $n = 63$ ) consisting of grades 9 through 12. In this particular band program, instrumental instruction is first available in the 5<sup>th</sup> grade. With this all participants in this study will have a minimum of one year of prior experience on their instrument. Instruments used for performance by the students in this study are all brass and woodwind instruments commonly used in American school band programs.

### **Survey Instrument**

Data in this study were gathered by asking all participants to complete a survey consisting of eleven separate prompts. The survey prompts were answered using a 5-point Likert scale and were designed to solicit the students' perceptions of the effects of SmartMusic in regard to their performing confidence, performance accuracy, effectiveness of practice, ability to find mistakes, practice method preference, satisfaction with the program, practicing efficiency, overall level of success, practice frequency, and practice length. Three of the eleven prompts were written in negative wording. Biographical information, including gender, grade level and instrument played was also requested. The prompt regarding student confidence was written twice, once in positive wording and once in negative wording so that a comparison between responses could be made. The survey also asked students their frequency of use of the program, and whether they used the program at home. Finally, respondents were offered the opportunity for written comment regarding any changes the respondent felt they would desire to be made to the program.

The dependent variable of this study is the student perspectives shown through the survey. There are two independent variables. The first are the participants themselves,

which consist of every band student in the school program, and second, the amount of time the students use the SmartMusic program, which is limited to 10 minutes per class meeting. The survey instrument is included below.

SmartMusic Survey

Please circle the answer that best matches the way you feel in response to the question.

1. Practicing with the SmartMusic program increases my confidence.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

2. Practicing with the SmartMusic program has helped me to play more accurately.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

3. My practicing using the SmartMusic program is more effective than without it.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

4. Practicing with the SmartMusic program helps me to find mistakes in my playing.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

5. Given a choice, I would rather practice with SmartMusic than without SmartMusic.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

6. Practicing with SmartMusic is frustrating.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

7. I learn music faster when I use SmartMusic.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Figure 1. SmartMusic Survey

8. I am less successful when I practice with SmartMusic.

1                      2                      3                      4                      5  
Strongly Disagree    Disagree            Neutral              Agree                Strongly Agree

9. I am less confident about my playing after using SmartMusic.

1                      2                      3                      4                      5  
Strongly Disagree    Disagree            Neutral              Agree                Strongly Agree

10. I practice more often when I have the opportunity to use SmartMusic.

1                      2                      3                      4                      5  
Strongly Disagree    Disagree            Neutral              Agree                Strongly Agree

11. SmartMusic makes me want to practice for longer periods of time.

1                      2                      3                      4                      5  
Strongly Disagree    Disagree            Neutral              Agree                Strongly Agree

Your grade \_\_\_\_\_  
(6-12)

Please circle your gender:    M    or    F

Your Instrument: \_\_\_\_\_

What is the average amount of times you practice with the SmartMusic program each week?

Once                      Two to five times                      More than five times

Do you use the SmartMusic program at home? \_\_\_\_\_

If you could change one thing about the SmartMusic program, what would it be?

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Figure 1 Continued.

## Chapter IV

### Results

Results were determined by compiling responses to prompts from individual student surveys. These individual surveys were sorted according to the three predetermined subgroups: high school band, middle school band, and sixth grade band. Results are presented in five sections: 1) mean scores calculated from the responses to the survey prompts, 2) raw data in percentages and Chi-square analysis of the responses to the survey prompts, 3) written responses, 4) home usage responses, and 5) usage frequency responses.

#### Mean Scores

Mean scores were calculated and are included on the table below:

Table 1.

#### *Mean Scores of All Surveys*

	HS Band	MS Band	Sixth Band	All Groups Combined
Prompt 1	3.08	3.18	3.74	3.29
Prompt 2	3.44	3.67	3.79	3.61
Prompt 3	3.29	3.24	3.13	3.23
Prompt 4	3.90	3.76	4.23	3.95
Prompt 5	3.10	3.29	3.69	3.31
Prompt 6	3.79	2.87	2.23	3.10
Prompt 7	2.76	2.89	3.38	2.97
Prompt 8	2.41	2.11	2.00	2.21
Prompt 9	2.40	2.24	2.08	2.27
Prompt 10	2.68	3.07	3.21	2.94
Prompt 11	2.62	2.71	3.08	2.77

The strongest positive mean scores are found in response to Prompt 4, “Practicing with the SmartMusic program helps me to find mistakes in my playing.” In responding to Prompt 4, the High School Band had a mean score of 3.90, the Middle School Band a mean score of 3.76, the Sixth Grade Band a mean score of 4.23. The mean score of all groups combined was 3.95. These results show high levels of agreement that the SmartMusic program helped them to find mistakes in their playing, with the highest agreement from the sixth grade student group. Also addressing performance accuracy, Prompt 2, “Practicing with the SmartMusic program has helped me to play more accurately” also resulted in strongly positive mean scores, with the High School Band scoring 3.44, the Middle School Band 3.67, the Sixth Grade Band 3.79. The mean score of all groups combined was 3.61.

Prompts 8 and 9 were intentionally worded in the negative. Both resulted in low mean scores through all groups. For Prompt 8, “I am less successful when I practice with SmartMusic,” The HS Band mean score was 2.41, MS Band 2.11, Sixth Grade Band 2.00 and the combined groups scoring 2.21. The results of these responses represent the lowest mean scores of any of the eleven prompts. Prompt 9, “I am less confident about my playing after using SmartMusic,” yielded mean scores of 2.40 for the HS Band, 2.24 for the MS Band, 2.08 for the Sixth Grade Band, and 2.27 for all groups combined.

Prompt 6, “Practicing with SmartMusic is frustrating,” resulted in a mean score of 3.79 for the HS Band, showing a high level of agreement. MS Band yielded a mean score of 2.87. Sixth Grade Band scored 2.23, indicating a high level of disagreement with the prompt. All groups combined scored a 3.10. These results would seem to suggest a

correlation with experience and frustration level, with frustration with the program increasing with age and years of experience playing an instrument.

Prompts 10 and 11 addressed student practice habits using the SmartMusic program. Prompt 10, “I practice more often when I have the opportunity to use SmartMusic,” resulted in primarily neutral mean scores. The HS Band mean score was 2.68, MS Band 3.07, Sixth Grade Band 3.21, and the combined groups scoring 2.94. Prompt 11, “SmartMusic makes me want to practice for longer periods of time,” had similar results. The HS Band scored 2.62, MS Band 2.71, Sixth Grade Band 3.08, and combined groups 2.77.

In investigating effectiveness of practice when using the program, Prompt 3 stated “My practicing using the SmartMusic program is more effective than without it.” Mean score for HS Band was 3.29, MS Band 3.24, Sixth Grade Band 3.13, and combined groups 3.23. Prompt 7, “I learn music faster when I use SmartMusic” resulted in a mean score of 2.76 for HS Band, 2.89 for MS Band, 3.38 for Sixth Grade Band, and 2.97 for all groups combined.

Prompt 1, “Practicing with the SmartMusic program increases my confidence,” is a positive statement of Prompt 9. Prompt 1 resulted in a mean score of 3.08 for HS Band, 3.18 for MS Band, 3.74 for Sixth Grade Band, and 3.29 for all groups combined. Investigating student preference, Prompt 5 “Given a choice, I would rather practice with SmartMusic than without SmartMusic” yielded a mean score of 3.10 for HS Band, 3.29 for MS Band, and 3.31 for all groups combined. Sixth Grade Band resulted in a strong mean score of 3.69, indicating a stronger agreement to the statement from the youngest, least experienced group.

## Raw Data/Chi Squares

To better compare the raw data by percentage, “Agree” and “Strongly Agree” responses were combined into an “Agree” category and “Disagree” and “Strongly Disagree” responses were combined into a “Disagree” category. The resulting categories – Agree, Neutral, and Disagree – were then analyzed by chi square as compared to equal distribution for significance.

As noted in Table 2, Prompt 4, “Practicing with the SmartMusic program helps me to find mistakes in my playing,” yielded very high and highly significant results. The HS students agreed with the statement 77.78% ( $p < .0001$ ), while the MS students agreed 70.21% ( $p < .0001$ ) and the sixth grade students agreed 82.05% ( $p < .0001$ ). All groups combined agreed with the statement 77.03% ( $p < .0001$ ).

Table 2.

### *Raw Data/Chi Square Results of Prompt 4*

#### **4. Practicing with the SmartMusic program helps me to find mistakes in my playing.**

##### HS Band:

Disagree	Neutral	Agree	No answer	Total	
6	7	49	1	63	Chi Square
9.52%	11.11%	77.78%	1.59%	100.00%	P=<.0001

##### MS Band:

Disagree	Neutral	Agree	Total	
5	9	33	47	Chi Square
10.64%	19.15%	70.21%	100.00%	P=<.0001

##### Sixth Grade Band:

Disagree	Neutral	Agree	Total	
2	5	32	39	Chi Square
5.13%	12.82%	82.05%	100.00%	P=<.0001

##### All Groups combined:

Disagree	Neutral	Agree	Total	
13	21	114	148	Chi Square
8.78%	14.19%	77.03%	100.00%	P=<.0001



Prompt 2, “Practicing with the SmartMusic program has helped me to play more accurately,” also yielded strong and significant results. As indicated on Table 3, the HS students agreed with the statement 58.73% ( $p < .0001$ ), the MS students agreed with the statement 71.11% ( $p < .0001$ ), and the sixth grade students agreed with the statement 58.97% ( $p = 0.0005$ ). All groups combined agreed with the prompt 62.59% ( $p < .0001$ ).

Table 3.

*Raw Data/Chi Square Results of Prompt 2*

**2. Practicing with the SmartMusic program has helped me to play more accurately.**

HS Band:

Disagree	Neutral	Agree	Total	
9	17	37	63	Chi Square
14.29%	26.98%	58.73%	100.00%	P=<.0001

MS Band:

Disagree	Neutral	Agree	Total	
8	5	32	45	Chi Square
17.78%	11.11%	71.11%	100.00%	P=<.0001

Sixth Grade Band:

Disagree	Neutral	Agree	Total	
3	13	23	39	Chi Square
7.69%	33.33%	58.97%	100.00%	P=0.0005

All Groups combined:

Disagree	Neutral	Agree	Total	
20	35	92	147	Chi Square
13.61%	23.81%	62.59%	100.00%	P=<.0001

Survey prompts 1 and 9 both asked the respondents to rate their confidence as influenced by the usage of the SmartMusic program. Prompt 1 is a positive statement: “Practicing with the SmartMusic program increases my confidence.” Prompt 9 is a negative statement: “I am less confident about my playing after using SmartMusic.”

When comparing the responses of all three groups together to these two statements on

Table 4, prompt 1 had an agreement response of 42.18%, while prompt 9 had a disagreement response of 68.03%. For both prompts, the sixth grade group scored higher than the MS group, which in turn scored higher than the HS group. The responses of the MS group to prompt 1 yielded results that were not significant (Chi square  $p=0.2822$ ) yet responses of the same group to prompt 9 indicated significant results (Chi square  $p<0.001$ ) when compared against equal probability.

Table 4.

*Raw Data/Chi Square Results of Prompt 1 and Prompt 9*

**1. Practicing with the SmartMusic program increases my confidence.**

HS Band:

Disagree	Neutral	Agree	Total	
13	31	19	63	Chi Square
20.63%	49.21%	30.16%	100.00%	P=0.0183

MS Band:

Disagree	Neutral	Agree	Total	
10	18	17	45	Chi Square
22.22%	40.00%	37.78%	100.00%	P=0.2822

Sixth Grade Band:

Disagree	Neutral	Agree	Total	
5	8	26	39	Chi Square
12.82%	20.51%	66.67%	100.00%	P=<.0001

All Groups combined:

Disagree	Neutral	Agree	Total	
28	57	62	147	Chi Square
19.05%	38.78%	42.18%	100.00%	P=0.001

**9. I am less confident about my playing after using SmartMusic.**

HS Band:

Disagree	Neutral	Agree	Total	
38	20	5	63	Chi Square
60.32%	31.75%	7.94%	100.00%	P=<.0001

MS Band:

Disagree	Neutral	Agree	Total	
33	6	6	45	Chi Square
73.33%	13.33%	13.33%	100.00%	P=<.0001

Sixth Grade Band:

Disagree	Neutral	Agree	Total	
29	6	4	39	Chi Square
74.36%	15.38%	10.26%	100.00%	P=<.0001

All Groups combined:

Disagree	Neutral	Agree	Total	
100	32	15	147	Chi Square
68.03%	21.77%	10.20%	100.00%	P=<.0001

Prompt 8, “I am less successful when I practice with SmartMusic,” yielded significant results for all groups. Table 5 indicates HS students disagreed with the negatively worded prompt 60.32% ( $p<.0001$ ), middle school students disagreed 75.56% ( $p<.0001$ ), and sixth grade students disagreed 74.36% ( $p<.0001$ ). All groups combined disagreed with the prompt 68.71% ( $p<.0001$ ).

Table 5.

*Raw Data/Chi Square results of Prompt 8*

**8. I am less successful when I practice with SmartMusic.**

HS Band:

Disagree	Neutral	Agree	Total	
38	19	6	63	Chi Square
60.32%	30.16%	9.52%	100.00%	P=<.0001

MS Band:

Disagree	Neutral	Agree	Total	
34	6	5	45	Chi Square
75.56%	13.33%	11.11%	100.00%	P=<.0001

Sixth Grade Band:

Disagree	Neutral	Agree	Total	
29	7	3	39	Chi Square
74.36%	17.95%	7.69%	100.00%	P=<.0001

All Groups combined:

Disagree	Neutral	Agree	Total	
101	32	14	147	Chi Square
68.71%	21.77%	9.52%	100.00%	P=<.0001

Prompt 6, “Practicing with SmartMusic is frustrating,” showed results that were both significant and not significant. As indicated on Table 6, HS students agreed with the negatively-worded statement 60.32% ( $p<.0001$ ), while sixth grade students disagreed with the statement 61.54% ( $p=0.0008$ ). MS students were split, with 48.89% disagreeing and 31.11% agreeing, yielding a result that was not significant ( $p=0.057$ ). All groups

combined were also split, with 36.73% disagreement, 23.81% neutral, and 39.46% agreement, but yielded a significant result ( $p=0.046$ ).

Table 6.

*Raw Data/Chi Square results of Prompt 6*

**6. Practicing with SmartMusic is frustrating.**

HS Band:

Disagree	Neutral	Agree	Total	
8	17	38	63	Chi Square
12.70%	26.98%	60.32%	100.00%	P=<.0001

MS Band:

Disagree	Neutral	Agree	Total	
22	9	14	45	Chi Square
48.89%	20.00%	31.11%	100.00%	P=0.057

Sixth Grade Band:

Disagree	Neutral	Agree	Total	
24	9	6	39	Chi Square
61.54%	23.08%	15.38%	100.00%	P=0.0008

All Groups combined:

Disagree	Neutral	Agree	Total	
54	35	58	147	Chi Square
36.73%	23.81%	39.46%	100.00%	P=0.046

Prompts 10 and 11 addressed student practice habits using the SmartMusic program. Prompt 10, “I practice more often when I have the opportunity to use SmartMusic,” resulted in no single response category gaining over 50% return and all groups were neutral, as indicated on Table 7. The HS Band was neutral to the statement 49.21% ( $p=0.0027$ ), MS Band 42.22% ( $p=0.4211$ ), Sixth Grade Band 48.72% ( $p=0.0921$ ), and the combined groups 46.94% neutral ( $p=0.0016$ ). Prompt 11, “SmartMusic makes me want to practice for longer periods of time,” had results that were

not significant. Chi Square result for the HS Band group was  $p=0.0842$ , MS Band  $p=0.085$ , Sixth Grade Band  $p=0.7334$ , and all groups combined  $p=0.0662$ .

Table 7.

*Raw Data/Chi Square results of Prompt 10 and Prompt 11*

**10. I practice more often when I have the opportunity to use SmartMusic.**

HS Band:

Disagree	Neutral	Agree	Total	
23	31	9	63	Chi Square
36.51%	49.21%	14.29%	100.00%	P=0.0027

MS Band:

Disagree	Neutral	Agree	Total	
12	19	14	45	Chi Square
26.67%	42.22%	31.11%	100.00%	P=0.4211

Sixth Grade Band:

Disagree	Neutral	Agree	Total	
8	19	12	39	Chi Square
20.51%	48.72%	30.77%	100.00%	P=0.0921

All Groups combined:

Disagree	Neutral	Agree	Total	
43	69	35	147	Chi Square
29.25%	46.94%	23.81%	100.00%	P=0.0016

Table 7. Continued

**11. SmartMusic makes me want to practice for longer periods of time.**

HS Band:

Disagree	Neutral	Agree	Total	
29	19	15	63	Chi Square
46.03%	30.16%	23.81%	100.00%	P=0.0842

MS Band:

Disagree	Neutral	Agree	Total	
19	18	8	45	Chi Square
42.22%	40.00%	17.78%	100.00%	P=0.085

Sixth Grade Band:

Disagree	Neutral	Agree	Total	
13	11	15	39	Chi Square
33.33%	28.21%	38.46%	100.00%	P=0.7334

All Groups combined:

Disagree	Neutral	Agree	Total	
61	48	38	147	Chi Square
41.50%	32.65%	25.85%	100.00%	P=0.0662

In investigating effectiveness of practice when using the program, Prompt 3 stated “My practicing using the SmartMusic program is more effective than without it.” Results indicated on Table 8 were mixed, with the HS and Combined groups yielding significant results while the MS and Sixth Grade groups were not significant. HS Band students agreed with the prompt 44.44% and were neutral 36.51% ( $p=0.0412$ ). All groups combined agreed with the prompt 42.86% and were neutral 46.69% ( $p=0.0095$ ). Prompt 7, “I learn music faster when I use SmartMusic” also resulted in mixed results. HS Band was 42.86% disagreed to the prompt but 38.10% neutral ( $p=0.0498$ ), MS Band was 55.56% neutral to the prompt ( $p=0.0067$ ), and all groups combined was 29.25% disagreed, 44.22% neutral, and 26.53% agreed to the prompt ( $p=0.0183$ ). Sixth grade band yielded results to the prompt that were not significant ( $p=0.0581$ ).

Table 8.

*Raw Data/Chi Square results of Prompt 3 and Prompt 7*

**3. My practicing using the SmartMusic program is more effective than without it.**

HS Band:

Disagree	Neutral	Agree	Total	
12	23	28	63	Chi Square
19.05%	36.51%	44.44%	100.00%	P=0.0412

MS Band:

Disagree	Neutral	Agree	Total	
10	15	20	45	Chi Square
22.22%	33.33%	44.44%	100.00%	P=0.1892

Sixth Grade Band:

Disagree	Neutral	Agree	Total	
11	13	15	39	Chi Square
28.21%	33.33%	38.46%	100.00%	P=0.7334

All Groups combined:

Disagree	Neutral	Agree	Total	
33	51	63	147	Chi Square
22.45%	34.69%	42.86%	100.00%	P=0.0095

**7. I learn music faster when I use SmartMusic.**

HS Band:

Disagree	Neutral	Agree	Total	
27	24	12	63	Chi Square
42.86%	38.10%	19.05%	100.00%	P=0.0498

MS Band:

Disagree	Neutral	Agree	Total	
10	25	10	45	Chi Square
22.22%	55.56%	22.22%	100.00%	P=0.0067

Sixth Grade Band:

Disagree	Neutral	Agree	Total	
6	16	17	39	Chi Square
15.38%	41.03%	43.59%	100.00%	P=0.0581

All Groups combined:

Disagree	Neutral	Agree	Total	
43	65	39	147	Chi Square
29.25%	44.22%	26.53%	100.00%	P=0.0183



Prompt 5, “Given a choice, I would rather practice with SmartMusic than without SmartMusic,” measured student preference. Noted on Table 9, no significant results were found in the HS Band group ( $p=0.4045$ ) and the MS Band group ( $p=0.2466$ ). The Sixth Grade group agreed with the statement 64.10% ( $p=0.0002$ ) and the combined groups agreed with the statement 48.30% ( $p=0.0006$ ).

Table 9.

*Raw Data/Chi Square results of Prompt 5*

**5. Given a choice, I would rather practice with SmartMusic than without SmartMusic.**

HS Band:

Disagree	Neutral	Agree	Total	
18	19	26	63	Chi Square
28.57%	30.16%	41.27%	100.00%	P=0.4045

MS Band:

Disagree	Neutral	Agree	Total	
11	14	20	45	Chi Square
24.44%	31.11%	44.44%	100.00%	P=0.2466

Sixth Grade Band:

Disagree	Neutral	Agree	Total	
7	7	25	39	Chi Square
17.95%	17.95%	64.10%	100.00%	P=0.0002

All Groups combined:

Disagree	Neutral	Agree	Total	
36	40	71	147	Chi Square
24.49%	27.21%	48.30%	100.00%	P=0.0006

**Written Responses**

Of the 147 surveys returned, 71 included written suggestions of how to positively modify SmartMusic. Of the 63 HS Band participants, 21 wrote suggestions, and 18 out of 45 MS Band members and 32 of the 39 sixth grade band members responded with suggestions. The written responses were reviewed for topic and/or content similarities

resulting in an appropriate classification of four separate categories. These categories were: 1) positive comments, 2) comments regarding dissatisfaction in the implementation of assignment design from the teacher, 3) assessment dissatisfaction, and 4) basic technology or technology implementation dissatisfaction. A general synopsis of the positive comments ranged from things the students liked about the program to students who wrote that they would not change anything. Dissatisfaction of assignment design was classified as anything the teacher could control regarding the implementation of the assignment or the assignment settings themselves. Assessment dissatisfaction comments mostly mention student frustration with SmartMusic's perceived assessment accuracy. Technology concerns were those that dealt with difficulties with the process of logging into the system, slow download speeds, and other general areas of technological concerns.

HS Band responses, with comments representative of the group and category, included 1 positive comment, "I like being able to retake the test as many times as I need to get the grade I want," 9 comments regarding assignment design, "Change the green bar to the beat like we like it," 5 comments regarding assessment dissatisfaction, "Count the notes that you play right, not wrong!," and 6 comments regarding technology-related dissatisfaction, "Make it faster, less confusing, easier to log in."

MS Band respondents gave 1 positive comment, "I would change nothing," 14 comments regarding assignment design, "easier tests," 3 comments regarding assessment dissatisfaction, "the way it grades you, it is too hard," and no comments regarding technology concerns. Sixth grade band written responses included 6 positive comments, "everything is fine, I wouldn't change a thing.," 10 comments regarding assignment

design, “instead of lines from the book I would prefer to be a song because it could be much funner,” 6 regarding assessment dissatisfaction, “For it to be more accurate.,” and 10 comments regarding technology-related dissatisfaction, “Make it easier to log in.”

### **Home Use**

Of the 147 respondents only 5 students indicated use of the program at home. This represents 3.4% of total responses. These responses consisted of 3 HS band students, 2 MS band students, and 0 sixth grade band students.

### **Usage Frequency**

Of the 63 High School respondents, 38 indicated using the SmartMusic program on average once a week, 17 used the program two-to-five times a week, 4 used the program for more than five times a week, and 4 did not respond. The Middle School students indicated 21 students used the program on average once a week, 24 two-to-five times a week, and no one indicated using the program more than five times a week. Sixth grade students indicated 18 who used the program once a week, 20 who used the program two-to-five times a week, none more than five times a week, and one individual gave no response. Total responses for all 147 responses combined are: 77 use the program on average once a week, 61 two-to-five times a week, 4 more than five times a week, while 5 offered no response.

## **Trend**

A trend is apparent when comparing the mean scores of each group between prompts. With the exception of Prompts 3 and 4 (Table 1), positively worded survey prompts yielded mean scores that increase as age and experience decrease. For example, in Prompt 2 (Practicing with the SmartMusic program has helped me to play more accurately) the mean score for HS Band is 3.44, MS Band 3.67, and Sixth Grade Band 3.79. Conversely, negatively worded prompts yielded mean scores that decrease as age and experience decrease. For example, in Prompt 8 (I am less successful when I practice with SmartMusic) the mean score for HS Band is 2.41, MS Band is 2.11, and Sixth Grade Band is 2.00. Exceptions to this trend are Prompt 3 (My practicing using the SmartMusic program is more effective than without it) indicated an increase in mean score as age and experience increased, with HS Band scoring 3.29, MS Band 3.24, and 3.13. Prompt 4 (Practicing with the SmartMusic program helps me to find mistakes in my playing) also is an exception to the trend, with HS Band scoring 3.90, MS Band 3.76, and Sixth Grade Band scoring 4.23. In the case of Prompt 4, the MS Band is the anomaly to the trend as the HS Band and Sixth Grade Band scores seem to follow the trend.

## **Chapter V**

### **Discussion**

#### **Summary**

The purpose of this study was to examine the effectiveness of the SmartMusic practice and assessment software with middle school and high school band students and to compare and analyze their perceptions of the effectiveness of the program. Participants of this study were band students ( $N = 147$ ) in grades 6 through 12 in a small West Texas public school. Students that elect enrollment in band are divided into three separate band classes: sixth grade band ( $n = 39$ ), 7<sup>th</sup>/8<sup>th</sup> grade middle school band ( $n = 45$ ), and a high school band ( $n = 63$ ) consisting of grades 9 through 12.

Data in this study were gathered by asking all participants to complete a survey consisting of eleven separate prompts. The survey prompts were answered using a 5-point Likert scale and were designed to solicit the students' perceptions of the effects of SmartMusic in regard to their performing confidence, performance accuracy, effectiveness of practice, ability to find mistakes, practice method preference, satisfaction with the program, practicing efficiency, overall level of success, practice frequency, and practice length. Biographical information, including gender, grade level and instrument played was also requested. There were two prompts concerning student confidence, one positive and one negative, allowing a comparison between the two. The survey also asked students their frequency of use of the program, and whether they used the program at home. Finally, respondents were offered the opportunity for written comment regarding any changes the respondent felt they would desire to be made to the program.

Results were determined by compiling responses to the eleven prompts from individual student surveys. These individual surveys were sorted according to the three predetermined subgroups: high school band, middle school band, and sixth grade band. Mean scores were calculated and included in Table 1. To better compare the raw data by percentage, “Agree” and “Strongly Agree” responses were combined into an “Agree” category and “Disagree” and “Strongly Disagree” responses were combined into a “Disagree” category. The resulting three categories – Agree, Neutral, and Disagree – were then analyzed by chi square as compared to equal distribution for significance.

## **Analysis**

### *Function of Program*

To form a conclusion of effectiveness of the SmartMusic program as a practice and assessment tool, the survey prompts and their responses have been divided into two categories: those that address the SmartMusic program as a practice tool and those that address the SmartMusic program as an assessment tool.

### *SmartMusic as a Practice Tool*

The survey instrument prompts designed to measure student perceptions of the SmartMusic program as a practice tool are Prompt 1, “Practicing with the SmartMusic program increases my confidence,” Prompt 3, “My practicing using the SmartMusic program is more effective than without it,” Prompt 5, “Given a choice, I would rather practice with SmartMusic than without SmartMusic,” Prompt 6, “Practicing with SmartMusic is frustrating,” Prompt 9, “I am less confident about my playing after using

SmartMusic,” Prompt 10, “I practice more often when I have the opportunity to use SmartMusic,” and Prompt 11, “SmartMusic makes me want to practice for longer periods of time.”

Sheldon et al. (1999) discovered a heightened motivation to practice in college aged students using Vivace, the intelligent digital accompaniment system that was the precursor to SmartMusic. While the Sheldon et al. study was done with college aged students, this study indicated that motivation to practice more using the SmartMusic program was higher with younger students. The best illustration of this point comes from Prompt 5, “Given a choice, I would rather practice with SmartMusic than without SmartMusic,” where the HS students’ mean score is 3.10 and the sixth grade students’ mean score is 3.69. These results could be attributed to the responses to Prompt 6, “Practicing with SmartMusic is frustrating,” in which the HS students’ mean score of 3.79 indicates lower satisfaction with the program itself, while the sixth grade students’ mean score of 2.23 indicates a much higher satisfaction with the program. Further illustrating the higher satisfaction of the sixth grade students was the number of positive written comments, 6 whereas only 1 middle school band student and 1 high school band student provided a written response.

Prompt 1, “Practicing with the SmartMusic program increases my confidence,” and Prompt 9, “I am less confident about my playing after using SmartMusic,” both measured student confidence after using the program. The HS students had a lower degree of agreement to Prompt 1 and disagreement to Prompt 9 (mean scores of 3.08 for Prompt 1 and 2.40 for Prompt 9) than the MS students (mean scores of 3.18 for Prompt 1 and 2.24 for Prompt 9). The sixth grade students showed the highest degree of

agreement to Prompt 1 (mean score of 3.74) and disagreement to Prompt 9 (mean score of 2.08).

The results were dissimilar in comparing the degree of agreement/disagreement between the prompts by subject groups. The high school band group had 30.16% agreement with Prompt 1 compared to 60.32% disagreement with Prompt 9. The middle school band group had 37.78% agreement with Prompt 1 compared to 73.33% disagreement with Prompt 9. The sixth grade band group had 66.67% agreement with Prompt 1 compared to 74.36% disagreement with Prompt 9. These comparisons all indicate stronger feelings of disagreement to the negative prompt than feelings of agreement to the positive prompt.

Prompt 10, "I practice more often when I have the opportunity to use SmartMusic," and Prompt 11, "SmartMusic makes me want to practice for longer periods of time," were expected to indicate the students' preference in using the SmartMusic program to affect practice frequency. Results again showed stronger mean scores as age decreased, with Prompt 10 mean scores indicating 2.68 from HS Band, 3.07 from MS Band, and 3.21 from Sixth Grade Band and Prompt 11 mean scores indicating 2.26 from HS Band, 2.71 from MS Band, and 3.08 from Sixth Grade Band. When Chi Square analysis was applied however, Prompt 11 showed results that were not significant in all groups. Prompt 10 showed significant results only in HS Band ( $p=0.0027$ ) and all groups combined ( $p=0.0016$ ). This only shows that the HS Band students are significantly neutral (49.21%) to increased practice frequency when provided the opportunity to use the SmartMusic program. While Sheldon et al. (1999) showed increased motivation to practice in college aged students, the only significant data presented from Prompt 10 or



Prompt 11 from this study to support those findings are the high school students' responses to Prompt 10, which had a mean score of 2.68. While not significant, the sixth grade students' mean score of 3.21 and the middle school students' mean score of 3.07 in response to Prompt 10 also indicated an increased motivation to practice using the program, supporting Sheldon et al.

The sixth grade students in this study indicate a higher level of satisfaction with the SmartMusic program than the older students, a higher level of preference to practice with the program than without than the older students, and a higher degree of confidence in their performance when using the program than the older students. Although results to Prompt 10, "I practice more often when I have the opportunity to use SmartMusic," were primarily not significant, the sixth grade students do show a higher degree of usage frequency than the older students. While the Sheldon et al. (1999) study was done with college aged students, this study indicated that motivation to practice more using the SmartMusic program was higher with younger students than older students.

#### *SmartMusic as an Assessment Tool*

The survey instrument prompts designed to measure student perceptions of the SmartMusic program as an assessment tool are Prompt 2, "Practicing with the SmartMusic program has helped me to play more accurately," Prompt 4, "Practicing with the SmartMusic program helps me to find mistakes in my playing," Prompt 7, "I learn music faster when I use SmartMusic," and Prompt 8, "I am less successful when I practice with SmartMusic."

Prompt 4, “Practicing with the SmartMusic program helps me to find mistakes in my playing,” addressed the students’ perceptions of their ability to find mistakes influenced by the usage of the program. This prompt resulted in the strongest mean scores across all groups, with high school students scoring 3.90, middle school students scoring 3.76, and sixth grade students scoring 4.23. These findings directly correlate to McKown and Cavitt’s (2008) measure of students’ self-evaluation abilities. However, unlike McKown and Cavitt’s lack of significant findings, this prompt produced significant Chi Square values ( $p < .0001$ ) for all student groups, indicating strong student perceptions of the SmartMusic program aiding their mistake finding ability.

McKown and Cavitt’s (2008) findings of increased self-evaluation skill using SmartMusic along with Ouren’s (1997) findings of performance rating improvements in rhythm and interpretation/musicianship when practicing with the Vivace accompaniment program are supported by the findings in this study. Further supporting McKown and Cavitt are the responses for Prompt 2, “Practicing with the SmartMusic program has helped me to play more accurately,” for which the mean score for HS Band was 3.44, MS Band was 3.67, and Sixth Grade band was 3.79. These results appear to represent strong student beliefs that SmartMusic is an effective tool in helping them to self-assess and modify their performance efforts. All three individual student groups agreed with the prompt strongly (HS Band 58.73%, MS Band 71.11%, and Sixth Grade band 58.97%) and all three individual groups presented significant Chi Square results (HS Band  $p < .0001$ , MS Band  $p < .0001$ , and Sixth Grade Band  $p = 0.0005$ ), yielding a strong conclusion of high student perception of effectiveness with the SmartMusic program in the area increased performance accuracy.

Additionally, Prompt 8, “I am less successful when I practice with SmartMusic,” further illustrates the high student perception of effectiveness of the program. Mean scores for this negatively worded prompt indicate overall student disagreement with the prompt, with high school students scoring 2.41, middle school students 2.11, and sixth grade students 2.00. Chi Square results were highly significant in all groups (HS Band and MS Band  $p < .0001$ , Sixth Grade Band  $p = 0.0001$ ) indicating the strength of the students’ disagreement with the prompt, lending significant strength to McKown and Cavitt’s (2008) findings that students using the SmartMusic program showed gains in self-assessment ability.

### **Usage Frequency**

Usage frequency responses indicate 138 of the 147 respondents, or 93.88%, use the program five times a week or less. As only 5 of the 147 students indicated using the program at home, the vast majority of the respondents only have access to the program at school. Additionally, only 1 of the students who indicated they used the program at home also indicated using the program more than five times a week, suggesting that only one of the home users is getting additional benefit of increased opportunities to use the program. 77 of the 147 respondents indicate using the program only once a week on average. These results correlate with the responses to survey prompt 10, “I practice more often when I have the opportunity to use SmartMusic,” in which 85.71% of HS students (the only group of this prompt to show significant results in Chi Square analysis) indicated neutrality or disagreement to the statement. For the high school students, their responses to Prompt 6, “Practicing with SmartMusic is frustrating,” in which 60.32% of the group

agreed with the statement lends some insight as to why 38 of the 63 members of that group indicated using the program only once a week. The unknown variable in analysis of this data is how often the students would practice without the program at all.

### **Assignment Design**

When analyzing the results of the written comments provided on the surveys, 33 of the 71 comments provided indicated dissatisfaction in the implementation of assignment design from the teacher. Assignment design was classified as anything the teacher could control regarding the implementation of the assignment or the assignment settings themselves. Nine of the written comments concerning assignment design were from the High School Band group, 14 were from the Middle School Band group, and 10 were from the Sixth Grade Band group.

Kozma (1991) indicated a multi-media lesson can enrich the learning environment; however the effectiveness of the lesson is dictated by the thoroughness of its design. Consequently, if the lesson is not well designed, the student could easily become frustrated and discouraged. The High School Band's mean score of 3.79 in response to Prompt 6, "Practicing with SmartMusic is frustrating," appears to show that the group is indeed frustrated with using the program. Bauer (2003) noted that a teacher's comfort level with technology can be achieved through specific training and frequency of use. Without the proper training, the technology can get in the way of the lesson. Of the 33 written comments regarding student dissatisfaction with assignment design, students wrote about issues involving the following:

- mechanical settings within the SmartMusic program, “Make the green bar follow the beat instead of the note” – high school student
- musical selection choices for the assignments, “Have music from all kinds of bands” – middle school student,
- time limit concerns for the assignments, “Need more rooms for the ones that wait till the last minute!” – high school student
- general dissatisfaction of using the program for assignments, “To not do it” – sixth grade student.

Ho (2004) discovered over a period of five years that student motivation and quality of learning was enhanced through growth and integration of music technology. As this study appears to show, using the SmartMusic program may result in increased student motivation in the younger students, and quality of learning is increased across all groups. Ho also pointed out that the technology must be properly planned and integrated.

### **Possibilities and Concerns**

This study indicates the SmartMusic software has the ability to improve student self-assessment in multiple ways. Students show increased ability to find mistakes in their playing and increase performance accuracy. As a music educator, any tool to aid students in these areas is appealing. With the proper training and experience, SmartMusic presents a powerful tool to aid music educators in classroom and private instruction. As Dye (2007) claimed, non-traditional delivery of instruction can be effective, but certain mechanical and logistical conditions must be met. The technology itself must not

interfere with the lesson, and the lesson must be designed with appropriate purpose. As shown in this study, while an effective tool, SmartMusic appeals to students in different ways, and therefore should not be used as a substitute for live traditional instruction, but can be effective in multiple ways as a supplemental instructional tool.

### **Implications for Music Education**

The lack of research existing regarding the effectiveness of technology tools such as SmartMusic in the instruction of instrumental music illustrates the difficult relationship between music education and technology. The study by Sheldon et al. (1999) was conducted over a decade ago using the Vivace system, an accompaniment tool that had no assessment capabilities. As the technology has advanced and access has increased, implementation of technology-based tools in music education has become more common (Rudolph, 2007), with more research in recent years investigating this increased use of technology. One would assume that these trends would continue, with research into technology use keeping pace with growing implementations.

Tools such as SmartMusic are valuable in many situations, but perhaps especially so when there is a lack of instructional resources, such as in understaffed or rural music programs. As Kuzmich (2008) and Rudolph (2007) noted, there are more technology-based tools available to the music educator and music student than ever before. This study indicated SmartMusic to be a software tool that is effective in many ways, yet lacks effectiveness in some areas. In order to be well rounded, the music education curriculum should use SmartMusic as well as other technology-based aids while maintaining the primary focus on traditional instruction.

## **Recommendations for Research**

As noted earlier, existing empirical research is often not contemporary and lacking in quantity and depth. Duplicating this study in various instructional settings could yield additional data for further analysis. In retrospect, the survey instrument used in this study could have been designed differently. The instrument perhaps could have been more effective if it would have focused on four or five distinct categories such as preference, practice frequency, and effectiveness, with an equal number of questions asked in each category both in positive and negative wording. Also possibly beneficial would have been the elimination of the “Neutral” response from the Likert scale.

It is possible that a study that measured results of more specific treatments would be valuable. As more and more advanced additional technology-based aids to music education become available, their effectiveness should be measured as well. Also beneficial to music educators designing technology integration would be a survey of music educators currently using SmartMusic to measure their usage habits and concerns of the program.

## **Summary**

The purpose of this study is to examine the effectiveness of the SmartMusic practice and assessment software with middle school and high school band students and to compare and analyze their perceptions of the effectiveness of the program. Data in this study were gathered by asking all participants to complete a survey consisting of eleven separate prompts and if desired provide written comments to suggest improvements to the program. The survey prompts were answered using a 5-point Likert scale and were

designed to solicit the students' perceptions of the effects of SmartMusic in regard to their practice and self-assessment habits. Results were determined by compiling and analyzing responses to the eleven prompts from individual student surveys and the written comments. Somewhat in agreement with earlier investigations, the results indicated that the SmartMusic program did increase motivation to practice in younger students. Importantly, findings in this study showed a significant increase in student self-assessment with all groups of student participants regardless of age or experience level.



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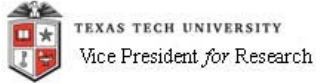
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## Appendix

### IRB Approval



December 20, 2011

Dr. Keith Dye  
Music - V&PA  
Mail Stop: 2033

Regarding: 503214 Student Perception of the Effectiveness of Smartmusic as a Practice and Assessment Tool on Middle School and High School Band Students

Dr. Keith Dye:

The Texas Tech University Protection of Human Subjects Committee approved your claim for an exemption for the proposal referenced above on December 16, 2011.

Exempt research is not subject to continuing review. However, any modifications that (a) change the research in a substantial way, (b) might change the basis for exemption, or (c) might introduce any additional risk to subjects must be reported to the IRB before they are implemented.

To report such changes, you must send a new claim for exemption or a proposal for expedited or full board review to the IRB. Extension of exempt status for exempt projects that have not changed is automatic.

The IRB will send annual reminders that ask you to update the status of your research project. Once you have completed your research, you must inform the Coordinator of the Committee either by responding to the annual reminder or by notifying the Coordinator by memo or e-mail ([donna.peters@ttu.edu](mailto:donna.peters@ttu.edu)) so that the file for your project can be closed.

Sincerely,

<Original signature available on request>

Rosemary Cogan, Ph.D., ABPP  
Protection of Human Subjects Committee