Engaging Student Singers:
Developing Reflection and Collaboration in a Technology-Enhanced Learning Environment

by

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Abstract

This thesis explores the integration of a wiki technology tool to support collaboration and reflection in a secondary school music context. The wiki intervention also allows the examination of students’ development of self-regulated learning processes, as well as the impact of such an approach on the role of the teacher within the classroom. The vocal wiki was integrated in a school setting, analyzed, and developed using a design-based methodology. The study began with a pilot phase, followed by two iteration cycles. At the end of each cycle, data was collected and analyzed to inform changes to the design of the wiki tool for the following iteration. Study participants involved 50 secondary music students as well as the teacher/researcher. The student-created content of the vocal wiki, which encompassed individual reflections, collaborative discussion, vocal recordings, and student-selected photos, as well as focus group interviews and the teacher/researcher journal, provided data for the design evaluation.

Data analysis included coding and descriptive summaries of student wiki contributions in the various design iterations, as well as three case studies intended to provide a deeper narrative exploration into individual student experiences of engaging with the vocal wiki tool. The data
was analyzed according to three dimensions that represented different aspects of the design, enactment, and overall impact of the vocal wiki tool: collaboration, reflection and performance. Study findings support the interpretation that there was an improved level of student agency and self-regulated learning that resulted from the process of reflection on performance as well as collaborative dialogue and peer interaction. By engaging in reflection on their own musical experiences, students gained efficacy in monitoring their own musical progress, and set more realistic musical goals.

Through the development of self-regulated learning skills, my work suggests that students become more independent as musicians, and further develop their musical identities, when they began to think differently about their own singing and their contributions to the ensemble. This work supports a pedagogical shift concerning the role of the music teacher in performance-based classrooms, from the traditional conductor-centered view to a more student-centered approach with a focus on reflection and collaboration.
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Table of Contents

Abstract .......................................................................................................................... ii

Acknowledgements ..................................................................................................... iv

List of Tables ................................................................................................................ xiii

List of Figures ............................................................................................................... xiv

CHAPTER 1: Introduction ............................................................................................... 1

  Researcher Background ......................................................................................... 3
  Research Goals ...................................................................................................... 7
  Theoretical Framework ........................................................................................... 7
  Research Questions ............................................................................................... 8
  Defining Central Constructs .................................................................................. 9
  Significance and Contributions of the Study ....................................................... 14
  Outline of the Thesis ............................................................................................. 15

CHAPTER 2: Literature Review ................................................................................... 18

  Cognitive and Sociocultural Foundations .......................................................... 18
  Social Constructivism ........................................................................................ 19
  Reflective Thinking ............................................................................................... 20
  Self-Regulated Learning and Metacognition ..................................................... 21
  Inquiry Models of Learning and Instruction ...................................................... 24
    The Role of the Teacher ................................................................................... 25
    Scaffolded Inquiry Models .............................................................................. 25
    Collaboration and Knowledge Building ......................................................... 26
    E-portfolios ..................................................................................................... 27
Music Learning and Pedagogical Approaches .......................................................... 28
Moving from the Aesthetic to Critical Pedagogy .............................................. 29
Learning Music: The Influence of Piagetian Theory ..................................... 30
Learning Theories in Music Education ............................................................. 30
   Mental Representations and Ways of Knowing in Music ................... 33
   Arts PROPEL .................................................................................................. 34
Innovations in Music Teaching ........................................................................ 35
   E-portfolios in Music Education ............................................................... 37
   Identity Development ................................................................................. 38
Technology-Enhanced Learning in Music Education ....................................... 39
Music Education for the 21st Century: The Impact of Technology .............. 42
   New Ways of Engaging with Music: “Net Geners” ............................. 43
   The Changing Role of the Teacher ......................................................... 44
   Changes in Assessment Practices ......................................................... 48
   A Role for New Technologies:
      Supporting Reflection and Collaboration ......................................... 49
      Reflection and Collaboration ............................................................. 51

CHAPTER 3: Methodology ................................................................................. 52
   Design-Based Research ........................................................................... 52
   Action Research ....................................................................................... 54
   Teacher-as-Researcher ............................................................................. 54
   Study Design ............................................................................................. 55
   Participants ............................................................................................... 56
Confidentiality ........................................................................................................ 57
Research Setting ........................................................................................................ 58
Music Curriculum Goals .......................................................................................... 60
Pilot Study: E-portfolio Tool ...................................................................................... 62
  Pilot Phase: Outcomes ............................................................................................ 63
Iterations 1 and 2: Wiki Technology ......................................................................... 66
Procedure .................................................................................................................. 68
Data Collection ......................................................................................................... 68
  Data Sources .......................................................................................................... 68
  Teacher/Researcher Journal .................................................................................... 69
  Focus Group Interviews .......................................................................................... 70
Case Studies ............................................................................................................ 71
Data Analysis ........................................................................................................... 72
  Dimensions of Analysis .......................................................................................... 77
Validation of Data Sources ......................................................................................... 78
Limitations of the Study ............................................................................................ 79

CHAPTER 4: Findings and Discussion ......................................................................... 80
  Chapter Overview .................................................................................................. 80
  Design Recommendations for Iteration One: Lessons Learned from
  Pilot Study ............................................................................................................. 80
  Iteration One: Design Analysis ............................................................................ 82
    Integration of the Wiki into Overall Course Design ......................................... 82
    Collaboration ....................................................................................................... 84
Reflection................................................................. 86
Performance ............................................................. 88
Iteration One: Enactment Analysis ..................................... 89
Collaboration............................................................... 90
Reflection ................................................................. 93
Performance ............................................................. 96
Iteration One: Role of the Teacher ..................................... 100
Iteration One: Impact Analysis ......................................... 101
Design Recommendations for Iteration Two: Lessons Learned from Iteration One ........................................... 102
Iteration Two: Design Analysis ......................................... 104
  Integration of the Wiki into Overall Course Design ............ 105
Collaboration............................................................... 108
Reflection ................................................................. 112
Performance ............................................................. 114
Iteration Two: Enactment Analysis ..................................... 117
Collaboration............................................................... 117
Reflection ................................................................. 121
Performance ............................................................. 125
Iteration Two: Analysis of Repeated Exposure Group’s Self-Reflection Processes .................................................. 132
Iteration Two: Role of the Teacher ..................................... 133
Iteration Two: Impact Analysis ......................................... 134
Design Recommendations for Future Iterations: Lessons Learned from Iteration Two

CHAPTER 5: Case Studies of Three Vocal Students

Harry: From Class Clown to Leading Man

Harry’s Musical Identity
Harry’s Collaborative Learning
Harry’s Self-Reflective and Metacognitive Engagement

Ashley: Happiest when Singing

Ashley’s Musical Identity
Ashley’s Collaborative Learning
Ashley’s Self-Reflective and Metacognitive Engagement

Kim: New to Singing

Kim’s Musical Identity
Kim’s Collaborative Learning
Kim’s Self-Reflective and Metacognitive Engagement

The Development of Musical Identity and Reflection:

Interpretations from the Case Studies

Student Musical Identity
Student Collaborative Learning
Student Self-Reflective and Metacognitive Engagement

CHAPTER 6: Discussion and Conclusions

Study Findings
Fostering Self-Regulated Learning
Creating the Learning Community ................................................................. 184

The Role of Technology ................................................................................. 187

Pedagogical Approaches in Music Education ................................................ 190

Implications for Music Education .................................................................. 194

Opportunities for Future Research ................................................................. 195

Closing Reflection: Introspective Narrative as Teacher ................................. 197

Looking Forward: Thoughts for the Future ...................................................... 201

References ......................................................................................................... 205

Appendix A: Information Letter to Parents and Guardians ............................. 220

Appendix B: Information Letter and Consent Form for Students ................. 222
List of Tables

Table 1. Focus Group Questions................................................................. 70
Table 2. Coded Analysis Tool: Scoring Rubric ............................................. 73
Table 3. Content Analysis Categories: Individual Reflections ....................... 74
Table 4. Content Analysis Categories: Collaborative Discussion Pages .......... 75
Table 5. Self-Reflection Rubric ................................................................... 76
Table 6. Comparison of Design Features: Pilot to Iteration 1 Content ............. 81
Table 7. Collaborative Wiki Quantitative Engagement, Iteration 1 .................. 90
Table 8. Analysis of Student Comment Showing Content Codes .................. 95
Table 9. Comparison of Design Features: Iteration 1 to Iteration 2 Content ...... 108
Table 10. Collaborative Wiki Quantitative Engagement, Iteration 2 ............... 118
List of Figures

Figure 1. E-Portfolio exemplar, grade 10 student ................................................................. 65
Figure 2. E-Portfolio exemplar, grade 12 student ................................................................. 66
Figure 3. Upper vocal class wiki, iteration one ................................................................. 83
Figure 4. Individual public page exemplar, iteration one ..................................................... 85
Figure 5. Collaborative discussion page, iteration 1 ............................................................. 86
Figure 6. Individual private page, iteration 1 ................................................................. 87
Figure 7. Coding of collaboration, iteration one ................................................................. 92
Figure 8. Graph of upper vocal class reflection scores, iteration one ................................. 94
Figure 9. Graph of senior vocal class reflection scores, iteration one ................................. 95
Figure 10. Graph of upper vocal class performance scores, iteration one ......................... 98
Figure 11. Graph of senior vocal class performance scores, iteration one ......................... 98
Figure 12. Senior vocal class wiki, iteration two ............................................................ 105
Figure 13. Upper vocal class wiki, iteration two ............................................................ 106
Figure 14. Composition process page, iteration two .......................................................... 110
Figure 15. Individual public page exemplar, iteration two .................................................. 111
Figure 16. Individual public page exemplar, iteration two .................................................. 112
Figure 17. Solo or small ensemble recording, senior vocal class, iteration two ................. 115
Figure 18. Coding of collaboration, iteration two ............................................................. 119
Figure 19. Graph of upper vocal reflective scores, iteration two ....................................... 123
Figure 20. Graph of senior vocal reflective scores, iteration two ....................................... 124
Figure 21. Graph of repeated exposure reflective scores, iterations one and two ............. 124
Figure 22. Graph of upper vocal class performance scores, iteration two ....................... 126
Figure 23. Graph of senior vocal class performance scores, iteration two.......................... 127

Figure 24. Graph of repeated exposure self-reflection scores ............................................. 133
Chapter 1: Introduction

We are the school children of today, in the school of yesterday, where the teachers of the day before yesterday instruct us with the methods of the Middle Ages, in order that we may tackle the problems of the day after tomorrow. (Pohjola, 1993, p. 11)

Many secondary music classrooms are structured according to a teacher-centered performance-based model, designed to replicate the ensemble structure of the concert band, orchestra or choir. Perhaps due to this established classroom structure that situates the teacher as the central figure (Miller & Seller, 1990), music educators have been slow to incorporate new pedagogies into their classrooms. While this performance oriented structure may be somewhat distinct from the “teacher-as-lecturer” approach that typifies instruction in most academic subjects, it is nonetheless quite traditional and teacher-centered in its own right. Many music classrooms are structured around predetermined objectives, measurable outcomes, and a pedagogical approach that follows a top-down transmission model (Miller & Seller, 1990). The “teacher as conductor” model positions the teacher at the front of the room in the role of controlling, directing, and shaping the ensemble music, and allows little opportunity for students and teachers to be co-learners (Bartel, 2000, 2001; Woodford, 1997). Additionally, there can be a lack of student interaction, student musical choice, and student engagement in learning processes in this model. Findings of the Coalition for Music Education in Canada’s most recent survey (2010) suggest that the most common form of music education in secondary schools is performance-based learning. The goal and frequent outcome of this performance-based pedagogical structure is a strong ensemble performance at concerts, which has been an integral part of music education due to the need for music to justify its place in the secondary school curriculum. Unfortunately, while students may develop musical skills through teacher-centered,
performance-based classroom models, they may become disinterested in formal music education because they are not fully engaged in the learning process and do not see the connections between school music and other areas of informal music-making and enjoyment of music in their own lives (Bowman, 2002; Regelski, 2002).

Music classrooms are gradually witnessing pedagogical changes, as researchers and educators are questioning traditional instructional models. Recent shifts in music education, such as the integration of different musical styles where students’ own musical cultures and preferences are increasingly recognized, have seen the introduction of new curriculum content moving outside of Western classical music. The Tanglewood Symposium of 1967 promoted the inclusion of music from all historical periods, styles, forms and cultures into the curriculum, including popular music (Murphy & Sullivan, 1968). Still, this new content has been primarily approached through traditional teaching processes especially in the genres of popular and jazz music. The pedagogical processes that occur in school music differ fundamentally from the ways that, for example, popular music is learned and practiced in everyday life (Green, 2008). The overriding learning practice for beginning popular musicians has been shown to be listening and copying, often in collaborative settings like jam sessions (Green, 2002). The idea of incorporating music production processes in music classrooms through technology tools and new pedagogies as well as broadening genres of popular music addressed in music programs has also been highlighted in recent research (Tobias, 2012, 2013).

A promising and highly accessible technology is that of digital recordings, which can be used to provide scaffolding and a source of immediate feedback to student musicians. Audio and video recordings can be incorporated into a cycle of collaborative reflections, including self and peer assessments, and provide valuable insights to students and teachers. A collaboration
element, such as peer discussion, can help to redistribute the balance of authority within the music classroom, since the teacher-as-conductor is no longer the only individual hearing the performances and making the artistic decisions.

This dissertation explores the integration of another technological innovation, in the form of a wiki technology, to support a collaborative, reflective and student-centered approach to music learning. By examining the literature on inquiry-based learning and technology as a cognitive and social scaffold, this research informs the design of a wiki environment that supports reflection and collaboration, including the use of digital recordings of vocal performances. The technology innovation was applied in a real school context, evaluated, and refined, in a design-oriented methodology. Student recordings, peer written feedback, and individual written reflections provided data for the design evaluation, which included an analysis of the role of the teacher and the interactions of students with their peers.

**Researcher Background**

Due to my role as both the teacher and researcher in this study, it is important to clarify my personal background as a musician, an educator and a researcher, as well as to position myself in this research. In Chapter 3 (Methodology), I outline the teacher-as-researcher role further and address any concerns with regards to this dual role in a design-based research methodology. Additional details of the unique e-school context, where technology is embedded into the curriculum and laptops are provided to students and teachers, as well as curricular approaches of the school music program are also outlined in Chapter 3. Because it may be relevant to understanding my own role as the researcher and teacher within this intervention, here I provide a short summary of my own trajectory as a musician and educator, emphasizing a growth of musical identity and autonomy.
My own identity as a music educator is constantly shifting, as I continue to grow and learn through interactions with my colleagues and my students. There was a pivotal moment that I recall from about nine years ago, when one of my choirs was involved in a music festival and the adjudicator was working with the choir after we had performed. We were working on a folk song arrangement and, throughout the workshop, the adjudicator challenged me to conduct less and less until I was really doing very little and giving up more of the ‘control’ of the piece (in terms of tempo and phrasing) to the choir. The adjudicator was trying to make the point that if I trusted the choir, then I could stop giving every little musical nuance in my gesture and, instead, back off to let the choristers be more involved in making the music. I remember clearly exclaiming, during the workshop, that this couldn’t possibly be working (when it was) because it felt like I was doing so little that I was “un-conducting the choir!” This was a major pedagogical shift for me, as a music educator, to realize that perhaps I could step back, control less, allow the music-making and artistic decisions to come from the choristers themselves, become less the expert and more the guide. As a young teacher, this was completely new pedagogical territory for me that was in direct contrast with almost all of my musical training as a conductor. Additionally, this new pedagogical idea also conflicted with how I had been taught by almost every music teacher with whom I had worked throughout my musical education.

I have been singing and making music for as long as I can remember. My first musical experiences were informal through singing and playing musical instruments at home with my family members who are not professional musicians, but who are all very musically inclined and enjoy making music together. Though some of my earliest and happiest musical memories are of informal music-making with my family, I was also fortunate to have been provided with many excellent formal music education experiences that shaped me into the musician that I am today.
I was fortunate to begin piano lessons at the young age of seven years and also played a variety of instruments throughout my school career. My school music programs were all performance-based with the music teacher conducting every class in the form of a band rehearsal to prepare us for concerts. As a saxophone player, I remember enjoying the instrumental music programs greatly throughout middle and secondary school, although my greatest musical love was always singing. I began singing in choirs through the church that my family attended and this choral involvement grew into singing lessons by the time I was a teenager. I was quite involved in choral music throughout my secondary school career, singing in my high school and church choirs as well as in the Toronto Mendelssohn Youth Choir. I was also given opportunities to perform in community musical theatre and to complete voice, piano, and music theory exams through the Royal Conservatory of Music. It was not surprising that I chose to study vocal music at university followed by a Master’s degree in music education.

I can’t pinpoint the moment when my musical identity as a singer and choral musician shifted to include roles as teacher and conductor. I had several opportunities to work professionally singing and conducting choirs during my university career, and this developed into my full-time career teaching voice at the secondary school level and conducting both children and youth choirs. I began teaching vocal music at my current school more than 10 years ago when I was first beginning my teaching career. I was also fortunate to act as the Curriculum Chair of the Visual and Performing Arts department for six years, a leadership role that focused on curriculum development and implementation in the arts including music, drama, dance, and visual arts courses. I have had many opportunities to integrate technology into my teaching due to this specialized e-school setting where technology is a central aspect of the school curriculum. I do not consider myself to be an expert in my use of technology, but I certainly have a strong
interest due to my school setting and the technology devices provided in this context. I have also been using portfolios as authentic assessment tools for 10 years in my teaching and have had the chance to develop e-portfolios over the past six years. I was inspired to use portfolios in my music classroom due to positive learning experiences with portfolio learning as a teacher candidate during my Bachelor of Education studies.

Fortuitously, I became interested in the use of portfolios at a time when there was a move away from traditional pencil and paper testing to more process-based forms of assessment. Through portfolio assessments, I found that portfolios served to enrich my knowledge of the music students, because they tended to detail facts of their musical lives outside of the classroom in their portfolio reflections. I would read about amazing musical experiences in which my students were involved outside of the classroom, about which I would never have known, had it not been for these reflections! I found it interesting that they were willing to reveal personal musical experiences, such as the process of auditioning for Canadian Idol or their emotional journey of writing a song, through the portfolio reflections. In my prior instruction, they had not volunteered to share such experiences in other kinds of journal or reflection activities.

My early experiences of working with portfolios and technology tools within an e-school context were occurring at the same time that I was completing my Master’s degree in Music Education through online and evening courses. It was through rich discussions on topics such as music pedagogy and curriculum philosophy that I began to look inward to how I created community in my music classes and how I was attempting to empower and engage students through their formal music-learning experiences in my classroom. As a result of both my teaching context and my Master’s degree work, I became interested in the general promise of
informal music learning strategies set within a formal music context, and the specific approach of integrating self-directed and self-regulated learning through the use of technology scaffolds.

Research Goals

Theoretical Framework

Within our rapidly changing and increasingly digital society, there is a need for innovation and experimentation in the pedagogical models employed within music classrooms. One source of insight for new pedagogical approaches is the educational research literature. Scholarly investigations of inquiry-based learning models (Linn & Eylon, 2006) or technology-enhanced music learning environments (Meyer et al., 2010a; Seddon & Biasutti, 2009), can serve to inform music educators’ progression beyond teacher-centred approaches, suggesting new kinds of curriculum activities, materials, assessments, and new roles for the teacher. This dissertation research is guided by a theoretical perspective of social constructivism that is shared by much of the research involving learning processes (Bransford, Brown, & Cocking, 2000), inquiry learning (Quintana, Zhang, & Krajcik, 2005; Slotta & Linn, 2009), self-regulated learning (Pintrich, 2000; Winne, 2001; Zimmerman, 2000) and collaboration (Rochelle, 1992).

A relatively new research discipline, known as the Learning Sciences (Kolodner, 1991) is a multidisciplinary field working to further our understandings of the nature of learning and cognitive development (Barab & Squire, 2004). Researchers in this field which include psychologists, educators, computer scientists, investigate cognition in context through curriculum, technological tools, and learning theories with the overall goal of a deeper understanding of how people learn. Learning scientists share the belief that knowledge and cognition are not entities that are found inside individual thinkers, but rather they are processes that involve several entities including the individual thinker, the environment and the activity in
which the thinker engages. I framed my research with this social-constructivist belief: That learning, knowledge creation, cognition and context are co-constituted and cannot be conceived as processes that occur in isolation (Barab & Squire, 2004).

As a methodology, design-based research is rooted in the pragmatic philosophy of Dewey, in his judgment of a theory not only by its claim to truth but by its power to effectively produce change in society (1933). Design-based research may serve to advance theory, but a condition that differentiates this research from other methodologies is that it must also demonstrate the value of the design in creating an impact on learning in the local context of the study (Barab & Squire, 2004). The local context of this study offers an opportunity for research in the area of technology-enhanced environments in music education, focusing on the support of students’ independent music learning and self-regulated learning processes. This study is also informed by action research, positioning the researcher in the dual role of teacher and researcher as well as in the desire to reflect and make changes in my own teaching (Conway & Borst, 2001).

**Research Questions**

This study examines the use of a wiki technology intervention to promote student reflection and collaboration in a secondary school vocal music context. The facilitation of vocal music students’ self-regulated learning skills through a performance-based program is examined, along with the impact of the technology-enhanced learning environment on the role of the teacher.

The following principal research question guided my study:

How can a wiki-based technology environment help to engage secondary music students in collaboration and reflection?
This question was addressed through a set of more specific sub-questions:

1) What design features promote self-regulated learning for secondary music students?
2) How does the wiki create new opportunities for music students to communicate and interact?
3) What are the important considerations for integrating the wiki technology deeply into a course design?
4) How does the technology-enhanced learning environment change the role of the teacher within the music classroom?

**Defining Central Constructs**

There are several key concepts that require definition as significant contributing ideas to the theoretical framework for this dissertation including self-regulated learning, metacognition, musical identity, self-reflection, inquiry learning, collaboration, reflection, and performance as well as several technology-based terms used in this dissertation.

My concept of self-regulated learning is based on Zimmerman’s theory of self-regulation (2000) that involves phases of planning, self-monitoring and self-evaluation. Although there are other models of self-regulated learning (Pintrich, 2000; Winne, 2001), I draw specifically on Zimmerman’s self-regulated learning (SRL) concept due to the socio-cognitive nature of his work that aligns with the theoretical framework of this dissertation. Zimmerman’s SRL model is cyclical and assumes that all students possess varying degrees of self-regulatory skills that can be supported and developed through instructional design and learning environments (Bol & Garner, 2011; Zimmerman, 2000). This idea of being actively involved in one’s own learning is also highlighted in Zimmerman’s model of self-regulated learning. He defines self-regulated learners
as individuals who are metacognitively, motivationally and behaviourally active participants in their own learning and suggests goal setting, monitoring, self-evaluating and reflecting as key SRL processes (Zimmerman, 2000). This theory aligns with Bransford, Brown and Cocking’s concept of metacognitions as learners’ abilities to predict their performances on various tasks and to monitor their current levels of mastery and understanding (2000). The critical aspects that differentiate metacognition from reflection are the learners’ awareness of their level of understanding and their ability to use this awareness as an indicator for their future learning experiences. I have expanded these definitions to include the notion that self-regulated learners grow to understand the value of reflection since their notion of self becomes the object of inquiry (Flavell, 2004).

I discuss the development of musical identity through various innovations in this study. In my concept of identity, I draw on Woodford’s definition of the imaginative view or role that individuals project for themselves in particular social positions, occupations or situations (Woodford, 2002, p. 675). Other scholars agree that the development of identity does not happen individually, but through social interactions and cultural constructions (Adler, 2002; Cameron & Carlisle, 2004; Hoffman, 2008; McCarthy, 1999). Roberts suggests that musical identity specifically is a social construct that does not exist on its own, but that is “constructed, confirmed, and maintained almost exclusively through interaction with others” (Roberts, 2004, p. 3). Additionally, students begin to identify themselves within the course subject matter at the same time that they are learning about course materials and skills (Hoffman, 2008; Pope, 1999). This is exemplified in music education through students beginning to identify themselves as instrumentalists or singers even with specific instruments or voice types. Thus, student musical
identity development is examined both through student interactions with the subject matter and student collaborative interactions on the vocal wiki.

I use the term “self-reflection” during the case study analysis to describe the process for exploration into one’s own experiences and practices. I extend my concept of self-reflection to incorporate the following two components from self-regulated learning literature: self-judgment, including self-evaluation and casual attribution, and self-reaction, including self-satisfaction/affect and adaptive or defensive responses (Zimmerman, 2000).

By inquiry learning, I am referring specifically to the constructivist pedagogical approach where activities and environments are designed that engage learners’ existing ideas and questions about the inquiry topic. Slotta & Linn (2009) identify self-reflective practices as an integral part of scaffolded inquiry in promoting the autonomy of learners. This emphasis on reflection is consistent with much of the literature outlined in the second chapter. Though the technology innovation design is not specifically an inquiry learning model, many of the learning goals are similar and the students were encouraged to raise questions about their own music learning and to pursue those questions through individual reflection and collaborative discussion supported by the wiki technology.

The two technology platforms that are used in this study are the e-portfolio and wiki tools. A wiki is defined as an online platform accessible through a web browser that is developed in collaboration by a community of users, allowing any user to add and edit content (Oxford University Press, 2014). As each community member edits a page of the wiki, a new version of the page is created and viewers see the latest version of the wiki page. Access to certain pages or areas on wikis can be restricted to individuals or a select group. The structure and design of the wiki used in this study is further detailed later in the dissertation as part of the
methodology and analysis chapters. A portfolio is a learning tool that includes a collection of selected work that incorporates reflection, documents learning processes and is often evaluative in nature (Yancey, 1996). An electronic portfolio (e-portfolio) is the digital format of a portfolio that can organize not only text, but also additional multi-media content (Upitis, Abrami, & Patteson, 2010).

The three dimensions that are used in the Chapter 4 design analysis are collaboration, reflection, and performance. Collaboration refers to activities and experiences, both in and outside of the classroom, that involve learning with peers, including students who are learning from each others’ insights and clarifying their own thinking through articulation and argument (Allsup, 2003; Vye et al., 1998). Drawing on collaborative and cooperative learning principles, I focus my examination of collaboration on student-to-student interaction with the goal of providing a learning environment where interactivity can occur through students working together to help each other learn (Webb, 1989; Webb & Mastergeorge, 2006). Promotive interactions (Johnson & Johnson, 2009) are an integral part of collaboration occurring when learners encourage and support each other’s efforts to realize the overall goal of the group. In the context of this study, positive interdependence among the vocal class members is an important factor in growth and development of the vocal class ensemble. In a vocal ensemble or choir, each singer plays a vital role through his or her individual musical contributions to the overall success and artistry of the group (Ashworth Bartle, 2003; Jordan, 1996; Pohjola, 1993). The sound quality and performance impact of a vocal ensemble depends on the contributions of each individual student voice. Thus, even in the context of a conductor-led choir or vocal ensemble, the idea of positive interdependence among singers is vital to the success of the group. In this study, with the emphasis on self-regulated learning process development and growing
musical independence, the principle of positive interdependence as part of collaborative growth becomes even more critical for the vocal ensemble. In the context of this study, I examine interactions of students in the vocal wiki context supporting and critiquing each other through online discussion in an attempt to realize the overall goal of improving as a vocal ensemble.

By reflection, I refer to the process of recalling and responding to past experiences through deliberate consideration and examination as a basis for evaluation and as a source for development and action (Richards, 1991). Reflection can occur in many forms, but for the purpose of this study, I most often refer to written reflections, both individual personal reflections and shared reflections through discussion posts in the vocal wiki context. Because this study takes place in a classroom context, I also make use of the Ontario Curriculum document description, which includes reflection as part of the critical analysis process involving thinking critically through questioning, evaluating, making rational judgments, finding logical connections and categorizing (Ontario Ministry of Education, 2010a, 2010b). Additionally, reflection can involve considering the degree of success of the artistic work with references to specific aspects that went well or could be improved. The process of reflection is further examined from a more theoretical standpoint in the next chapter.

My use of the word “performance” is meant to include all aspects of music-making in the classroom context. This concept is distinct from the way that David Elliot (1995) and Christopher Small (1998) use the terms “musicing” and “musicking” respectively, both of which also include aspects of performance. I deliberately use the term “performance” to encompass musical process aspects such as practicing, improvising, developing technical skills, and sharing creative musical works through singing or playing instruments with others to form a key part of the creative process as defined by the Ontario Curriculum documents for The Arts (2010a,
This aligns with the curriculum documents of the study school which make use of the term “performance” in the same way, referring to all music-making activities that involve the voice or instruments, as differentiated from written music theory or music analysis areas, though these areas are very closely connected. My pedagogical goal for “performance” in my music classes includes Bartel’s (2004b) notion of music-making as a meaningful experience for the music-makers through the creation of a social community within the class without performances necessarily being shared with a public audiences. I also recognize that the second phase of Zimmerman’s model of self-regulated learning is often referred to as the performance phase and includes self-instruction, imagery, task strategies, self-observation, and self-experimentation (Abrami et al., 2011; Zimmerman, 2000). In a music education context, these processes could each be considered a part of active music-making, although I am not referring specifically to Zimmerman’s self-regulated learning process when I discuss the dimension of performance in this study.

Significance and Contributions of the Study

This dissertation contributes a design-based study to the growing body of literature on technology-enhanced learning in vocal music education. With research questions that address both the student and teacher perspectives of this integration, this study is a new addition to the continuing exploration of technology-enhanced learning and how this impacts the roles of teachers and students in 21st century music classrooms. Specifically, this study makes new contributions in four key areas:

1) Technology-enhanced learning in a vocal music context
2) Design-based research in music education
3) Self-regulated learning processes in the secondary-school music classroom
4) The evolving nature of 21st century music classrooms: engaging students and creating communities for learning

This study advances ideas on curricular design and technology integration in music education at the secondary-school level. Additionally, self-regulated learning skills in music education have been examined more extensively in private teaching contexts, through the Royal Conservatory of Music programs in Canada (Upitis et al., 2010a), but less at the classroom level.

It is important to clarify that generalization of findings is not the intention of this study, nor is it advisable given the action-orientation of the study. Rather, this research aims to situate a technology design in a specific learning context and discuss design cycles and improvements qualitatively. The findings of this study, taken within context, would be interesting to readers and scholars in several areas, including: technology-enhanced learning, self-regulated learning, student musical identity development, student metacognitive engagement, and design-based research in music education.

Outline of the Thesis

This thesis is organized into six chapters, including the present chapter, which has outlined the context for the research and detailed my background as a music educator to clarify my position in the study. Chapter 1 also introduces the study motivation, research questions, central constructs, and significance of the study.

The second chapter examines the current literature in several different fields that has served to inform and to shape the direction of this study. Chapter 2 is divided into three sections, both for organization of the different research fields and to highlight the connections between these areas. The first section consists of a review of the development of social constructivist theories, highlighting important foundational concepts as theorized by Piaget (1936), Vygotsky
(1978), and Dewey (1933). The next area that is explored is how these social constructivist theories led to more current pedagogical approaches, such as inquiry learning. Important pedagogical aspects of this approach, such as the role of the teacher, scaffolded inquiry models, collaboration and knowledge building, are explored through current models in practice. The second section of the literature review explores foundational literature in the field of music education with a focus on learning theories in music education. The third section of the literature review combines themes from the first two sections through an outline of the impact of social constructivist theories and inquiry learning in the field of music education. This final section of the literature review focuses on innovations in pedagogical approaches in music education, including a discussion of the role of the teacher and changes in assessment practices that come with these new approaches. Throughout this literature review, the common thread is the importance of collaboration and reflection in learning processes.

Chapter 3 details the design-based methodological approach and the specific research design and procedures of this study. This chapter also addresses important ethical concerns such as confidentiality of study participants and clarifies the teacher-as-researcher position as situated in design-based and action research traditions. Chapter 4 outlines the data analysis, including study findings and discussion and is structured according to the two design cycles (i.e., iteration one and iteration two). Data findings are presented through a design analysis, enactment analysis and impact analysis, followed by design recommendations for future iterations. Each sub-section of the iteration analysis is divided into the three selected dimensions of collaboration, reflection, and performance.

Chapter 5 outlines the three case studies intended to provide a deeper look into the individual student experiences of study participants during the design implementation. Each of
the case studies begins with a detailed description of the student and then moves into an analysis of the student’s development through three main areas of musical identity, collaborative learning, and metacognitive engagement. The case studies conclude with a discussion of the overall development of reflective musical growth including general interpretations from the case studies.

Finally, Chapter 6 presents a culminating discussion of the analysis findings organized around the study research questions. This chapter outlines implications of the dissertation for technology-enhanced learning environments in support of collaboration and reflection in music education and future research opportunities emerging from this study.
CHAPTER 2: Literature Review

This study is shaped by research from the fields of education and the learning sciences as well as music education, all of which are relevant to the design of an interactive wiki technology tool for classroom-based music learning. The literature review encompasses several diverse fields and draws on ideas from cognitive and sociocultural foundations in educational research as well as pedagogical foundations in music education. The first sections below review the development of social constructivist theories, including inquiry models for learning, and learning theories in music education, respectively. The third section combines themes from the first two sections and focuses on the impact of the learning sciences, educational theory, and technology developments in the field of music education.

Cognitive and Sociocultural Foundations

The constructivist theory is central to many domains of educational research, with the basic position that learners generate knowledge and meaning from their experiences and use existing knowledge as a basis for building new knowledge. Constructivism is rooted in Piaget’s (1936) theory of cognitive development which proposed that children progress through four stages of development through childhood: the sensorimotor period (0–2 years), the preoperational period (2–7 years), the concrete operational period (7–11 years), and the formal operational period (11 years and up). As children move through these stages, their mental structures (which Piaget called schemes) are joined with processes to actively contribute to cognitive development. Piaget’s two fundamental processes leading to cognitive development were those of assimilation, where new ideas are reshaped and made to fit into a child’s existing conceptualizations, and accommodation, where new ideas force a restructuring of concepts and ideas (Piaget, 1972).
Piaget’s theory of cognitive development has influenced many other theorists and researchers; however, his theory was criticized as not accounting for changes that occurred on a conceptual level as a part of knowledge acquisition (Carey, 1985, 1999). Conceptual change is a very gradual process that deals with changes at the level of the learner’s understanding of individual concepts. Chi (2008) has proposed three different modes of conceptual change: belief revision, mental model transformation, and categorical shift. Common to each of these modes is that the learner’s prior knowledge is in conflict with the new concept that is being acquired. For example, science novices often have misconceptions of physical properties; whereas, in the social sciences and humanities, preconceptions can include stereotypes or simplifications (Bransford, Brown & Cocking, 2000). These misconceptions can be very powerful for children and, therefore, it is imperative that children are provided with opportunities to build on and challenge their initial understandings through pedagogical approaches that allow them to develop their own understandings.

Social Constructivism

Vygotsky’s (1978) contribution emphasized the notion that knowledge is constructed through social interaction with others, with language mediating thought and conceptual development. Vygotsky (1978) was particularly concerned with the social nature of language and viewed learning as a lifelong process that is socially negotiated through the use of language and collaborative exchange. A key concept in Vygotsky’s theory was the notion of a Zone of Proximal Development (ZPD), which asserted that children’s development proceeds through participation in activities slightly beyond their competence with the assistance of more experienced learners, such as peers or teachers. Much research has investigated how the notion of ZPD can contribute to learning and instruction, through models that include peer-exchange
(Palinscar & Brown, 1984), technology "scaffolds" (Linn & Hsi, 2000) and collaborative inquiry (Slotta & Linn, 2009). Vygotsky’s theory of constructivism, with his focus on social context, influenced the work of Bruner (1996) on “agency” in learners. Bruner’s theory focuses on the changing role of the teacher as co-learner, as well as on increased learner autonomy, as students play an active role in organizing the material to be learned.

**Reflective Thinking**

Several prominent theorists have supported the notion of reflective practices as a key aspect of metacognitive development. Dewey is an originator of the concept of reflective thinking, which involves the active examination of an individual’s assumptions and ideas, especially as they are examined through the lens of experience, bringing forward new understanding for the learner (1933, p. 9). This idea of reflection as a process involving individual learners’ past experiences and beliefs has been supported by other researchers (Solomon, 1987). Dewey’s vision also involves the idea of reflective thinking as a cognitive process that could be developed both through education and experience (1933). Dewey views knowledge as a mode of experience that is demonstrated through the process of reflecting on experience and it is this process that informs future actions (Dewey, 1933; Vanderstraeten, 2002). Thus, the learner constructs knowledge through reflection on experiences. Dewey’s conception of knowledge aligns with the constructivist view that learners understand new experiences by linking them to past experiences and that it is through this process of connecting and linking experiences that knowledge is constructed. It is important to recognize that this reflective process is not necessarily one that is developed easily in all learners and, like other cognitive skills, must be nurtured. Reflective learning can be conceived as a metacognitive skill as it is concerned with more than simply the outcome of learning, but focuses instead on
learners’ thoughts about how they moved through the process (Borkowski, Carr, Rellinger, & Pressley, 1990; Scott, 2010).

Building on Dewey’s concept of reflection, Schön (1983) introduced his theory of reflective professional learning in which he defined reflective practitioners as being aware of their implicit knowledge base and learning from their experiences. Schön differentiated reflection-in-action, reflecting on behaviour as it happens, from reflection-on-action which included analyzing and evaluating the situation after it had occurred. Both of these reflective processes involved building new understandings based on experiences that were occurring or had previously occurred that would serve to shape future choices and events.

Reflection has also been conceptualized as a process that involves different levels of learning (Kember et al., 2000; King & Kitchener, 1994). Kember et al. (2000) outlined a typology of four different levels of reflective thinking based on the work of Dewey (1933) and Schön (1983): habitual action, understanding, reflection, and critical reflection. The first two levels are described as surface levels of thinking, involving prior categorizations, and it is not until the third level that the raising of questions and problems of previously assumed situations takes place. Finally, at the fourth level of critical reflection, the learners become aware of why they perceive, think, feel and act as they do (Kember et al., 2000, p. 386). According to this model, it is also at this final level that metacognitive development occurs, as the learner creates meaning stemming from this new awareness, fostering a change of conceptual perspective.

**Self-Regulated Learning and Metacognition**

Bransford, Brown and Cocking (2000) define metacognition as learners’ abilities to predict their performances on various tasks and to monitor their current levels of mastery and understanding. Similarly, Flavell (2004) suggests that the concept of metacognition helps
learners understand the value of reflection as their notion of self becomes the object of inquiry. According to Bereiter and Scardamalia (1989), metacognition also includes self-regulation, which they define as the ability to orchestrate one’s learning including planning, monitoring successes, and correcting errors when appropriate, all necessary for effective intentional learning. Zimmerman’s (2000) self-regulated learning (SRL) model incorporates advances in cognitive science designed to support student engagement in their own learning processes employing ongoing feedback cycles that consist of three phases: forethought, performance control, and self-reflection. The forethought phase consists of task analysis such as goal setting and planning, the performance control phase is made up of self-instruction, self-recording and self-experimentation, and the final self-reflection phase includes self-judgment, self-evaluation, causal attribution, self-reaction, self-satisfaction and adaptive inferences (Zimmerman, 2000). The SRL model, which was designed to teach self-regulated learning skills such as goal setting, monitoring and reflection, has been advanced as a possible theoretical framework in music education for e-portfolio learning (Meyer et al., 2010a).

Further to this self-regulated learning model, Bransford, Brown, and Cocking (2000) differentiate metacognition from self-regulation by the addition of the ability to reflect on one’s own performance. They note that where self-regulation may appear in early learners, reflection appears to develop somewhat later. Evidence suggests that, like other forms of learning, metacognition develops gradually and is equally dependent on learner knowledge and experience.

Teaching practices with a metacognitive approach often focus on self-assessment and reflection, asking questions of learners in terms of what worked in their learning and what parts of their practices needed improvement. This approach has been shown to increase the degree to
which students transfer their learning to new contexts and events (Bransford, Brown, & Cocking, 2000). Linking these ideas to affect and motivation, learners are inspired when they recognize the usefulness of what they are learning and, even more so, when they realize that the learning is having a positive impact on others in the community (Bransford, Brown & Cocking, 2000). This idea of connectivity as a motivating factor in learning can be linked to research on the inclusion of informal learning practices, such as teenagers playing in a garage band setting, in formal music education (Allsup, 2004a; Green, 2002, 2008; Westerlund, 2006). Additionally, Collins and Halverson (2009) use technological innovations to draw links between formal and informal learning by recognizing the learning that takes place in school settings outside of the classroom through video games, online communities, and technology-based extra-curricular clubs.

In considering formal (in school) and informal learning (occurring outside of institutional settings), Resnick (1987) notes that there is not supposed to be much continuity between what one knows outside school and what one learns in school and that students are often discouraged from bringing their informally acquired experiences into the school setting. This separation between formal and informal education is problematic in all educational contexts but, in particular, in music education. If students are consistently discouraged from bringing informally acquired musical experiences into the classroom, this can have a strong impact on their desire to continue music-making in a school setting since their musical opinions and experiences are not valued. Perhaps their experiences of interacting with music outside of the institutional school setting with their peers and through technology will be more readily available and satisfying to them than music in a school context. This re-thinking of the narrow view of learning as connected only to schooling is a critical reconceptualization that educators must confront and incorporate into their practices.
One of the key implications for teaching with a metacognitive approach according to Bransford, Brown, and Cocking (2000), is that teachers must draw out and work with the pre-existing understandings that their students bring with them. This requires a move from the transmission approach to a classroom environment where conditions are created under which student thinking can be revealed. Traditional music education contexts do not always recognize the varied musical experiences and rich musical knowledge that many music students already possess when they enter the music classroom (Bartel, 2004a; Peters, 2004). Too often, students are viewed as “empty vessels” or “blank slates” waiting to be filled by the knowledge that the expert teacher will share with them (Freire, 1970; Peters, 2004). To support new pedagogical approaches, there is a need for assessments to move beyond traditional concepts of testing to assessments with the goal of making students’ thinking visible (Bransford, Brown, & Cocking, 2000). If the ultimate goal of learning is understanding and knowledge creation, then institutional structures such as assessments must also move to foster this new classroom environment where student thinking is prioritized over the memorization and recall of facts.

**Inquiry Models of Learning and Instruction**

Inquiry-oriented approaches to learning and instruction, particularly in science topics, have been informed and shaped by constructivist foundations. Several key ideas embedded in this pedagogy stem from constructivist underpinnings including learner agency, scaffolded experimentation, collaborative learning, and metacognitive development. Inquiry learning can be defined as a constructivist approach where students research and investigate a phenomenon before making inferences about it (Kuhn et al., 2000). This pedagogy involves guiding students through activities that engage with their personal experiences about an inquiry topic, scaffolding their use of experiments and models, and encouraging reflection and collaboration (Slotta &
Linn, 2009). Substantial research literature from the learning sciences has focused on the investigation of different models of inquiry, collaboration, and reflective learning, as well as the use of technology as a means of scaffolding different learning processes.

**The Role of the Teacher**

In inquiry models, the role of the teacher shifts from the central role of “expert lecturer” to that of a “guide-on-the-side,” encouraging the learners to discover, organize ideas and explore questions. Because students are placed more at the centre, in terms of defining and then achieving their own learning objectives, the teacher no longer controls the flow of information within the classroom, and thus, shifts from being an instructor to a facilitator (Collins & Halverson, 2009). The introduction of scaffolding technologies further contributes to reducing the centrality of the teacher, who can now rely on the technology-enhanced media and learning environments to support student activities and is, thus, no longer the sole source for providing knowledge.

**Scaffolded Inquiry Models**

Scaffolded inquiry models involve learning through interaction with carefully designed learning environments and the collaborative negotiation of ideas (Slotta & Linn, 2009). Scaffolding is a way to support student-centered constructivist approaches and is often linked to Vygotsky’s Zone of Proximal Development. In its original formulation (Wood, Bruner, & Ross, 1976), scaffolding was described as a process where instructors “control” or support parts of a task that are too difficult for children to achieve on their own, thus enabling them to focus on other aspects where they have established capabilities and ultimately achieve the tasks as a result of the beneficial supports. The process of developing scaffolds amounts to one of customizing
the constructive learning environment to the needs of the learner by providing structured
guidance that helps the learner solve problems.

Considerable research has investigated scaffolded inquiry, where the learning activities
are often collaborative by design (Slotta & Linn, 2009; Quintana et al., 2004; Linn & Hsi, 2000). Research studies have investigated a wide range of questions related to the effectiveness of different curriculum designs or technology tools in enabling students to develop a personal understanding of instructional topics (Linn & Eylon, 2006). Such approaches can be somewhat challenging for classroom teachers to put into practice, due to their increased time requirements, the need to re-plan course curriculum, and the availability of technologies and support (Slotta & Linn, 2009).

**Collaboration and Knowledge Building**

Collaboration is a central part of inquiry-based learning and is a key aspect to the effective learning of all individuals in the community in this approach. Collaborative construction of knowledge and computer-supported learning environments were studied by Scardamalia and Bereiter (1996, 2003, 2006) in their ongoing studies of knowledge building. This approach focuses on the creation and advancement of ideas that are shared within a community of learners, such as a classroom of learners collaborating with their peers and teachers (Bereiter, 2002). Central to knowledge building is the concept of collective cognitive responsibility, which refers to a group taking responsibility for understanding what is occurring in the learning process as well as the communication of the learning goals among all group members (Scardamalia, 2000). Knowledge building is situated in constructivist theory, with the teacher again serving as a guide, and students taking on much greater agency in the learning process.
Wiggins (1999-2000) has researched social constructivist implications for music educators including an examination of characteristics of shared experiences of third-grade students involved in composing music. Her conclusions highlight advantages of collaborative work, such as the notion that groups profit from shared understandings and that working collaboratively with others benefits individual students by promoting independent musical thinking.

E-portfolios

Electronic portfolios (e-portfolios) are innovative assessment tools that incorporate many pedagogical advantages of technology-integrated learning environments as well as knowledge principles grounded in constructivist theory. According to Yancey (1996), a portfolio is defined as a collection of selected work that includes reflection, presumes development, documents diversity and is communicative and evaluative in nature. An e-portfolio is the digital format of a portfolio that can organize not only text, but also the additional multi-media content of images, video, and sound (Upitis, Abrami, & Patteson, 2010). Portfolios can vary greatly in both their format and purpose, with some approaches intended to demonstrate best works of learners, where others focus on the development of process through self-assessment (Brown, 2002). E-portfolios in educational contexts often focus on the evaluation of learner progress across a period of time (Clark, 2010; Desmet et al. 2008; Morrison, 2004; 2010). A central concept to this model is the notion of reflective thinking as a cognitive process that can be fostered through e-portfolio development (Clark, 2010; Bauer & Dunn, 2003; Rickards et al., 2008).

The e-portfolio process draws upon some of the same cognitive processes that are engaged by scaffolded inquiry methods, which promote the autonomy of learners, such as self-reflective practices of comparing ideas, looking for ways to make connections, and seeking
understanding of problems (Slotta & Linn, 2009). These types of reflective practices can encourage learners to build links between emerging skills and content knowledge with their own personal progress and goals, leading to lifelong learning.

In terms of curriculum design, the e-portfolio approach is well suited to inquiry-oriented instruction where students learn through engagement in inquiry-oriented curriculum that is designed to make learning and thinking visible, promote autonomy, and help students learn from their peers (Slotta & Linn, 2009). The idea of making learning and thinking visible is a key component of the e-portfolio tool development. Additionally, collaborative aspects to e-portfolios such as portfolio sharing can encourage students to learn from their peers. In a language writing context, Yancey (1996, 2009) views reflection as the metacognitive counterpart to revision and concludes that together, these two activities allow writers to critique their own texts (reflection) and to make changes in these texts (revision). Collins and Halverson’s (2009) idea of learner control and customization in technology-enhanced learning environments can also be linked to the e-portfolio model where learners are challenged to develop personal learning goals and employ agency (Yancey, 1996). Although e-portfolios are usually developed individually, there is still much opportunity for collaborative learning in this process through peer sharing and discussion (Frazes Hill, 2008).

**Music Learning and Pedagogical Approaches**

In the past, various theories in music have been used as a means of justifying the inclusion of music education in schools. Even today, the inclusion of music as a subject area in elementary and secondary schools across Canada varies widely (Coalition for Music Education in Canada, 2005, 2010). The uneven history and uncertain future of music education as a formal school subject area accounts for the advocacy tone underpinning these philosophies.
Moving from the Aesthetic to Critical Pedagogy

Since the 1970s, two of the foundational philosophical views on music teaching and learning have been Bennett Reimer’s view of Music Education as Aesthetic Education (MEAE) and David Elliot’s Praxial Music Education (PME). Grounded in expressionism, Reimer’s (2003) vision of MEAE positioned music education as contributing to a broader “aesthetic education” with the primary role of education in the arts as the education of human feeling. MEAE also involves intellect, along with emotion, since the aesthetic reaction to what is heard or seen occurs as the mind consciously contemplates an object of art. In contrast, Elliot (1995, 2014) presented PME as a philosophy of music education that was more clearly linked to the act of music-making because, in his view, people develop musicianship through active engagements such as through performance. He used the term “musicing” to define active music-making (such as performing or improvising) and connected this idea, along with other musical activities such as listening and composing, to educational strategies including: coaching, modeling, problem finding, problem solving and scaffolding. Elliot’s PME philosophy focuses on a comprehensive and reflective approach to music instruction and music learning that includes self-growth and self-identity development. Although neither of these two main philosophies explicitly advocate an inquiry based approach, many theorists today emphasize the importance of the social nature of music-making.

More recently, the concept of music has been positioned as an activity that people do, as opposed to an autonomous object, and as a social activity that is explored through relationships that make up social identities (Bowman, 2002; Small, 1998). There is also a relatively recent exploration into how music education might serve to advance social change with goals of challenging dominant paradigms in music education (Allsup, 2004b; Benedict & Schmidt, 2007;

**Learning Music: The Influence of Piagetian Theory**

Piaget’s theory of child development strongly impacted research on how children learn music (Petzold, 1963; Serafine, 1988; Shuter-Dyson & Gabriel, 1981; Sloboda, 1985; Zimmerman, 1984). This research established a developmental sequence of musical concept formation beginning with the ability to form musical concepts about volume followed sequentially by timbre, tempo, duration, pitch and harmony (Zimmerman, 1982). Several methods of early music instruction, such as the Dalcroze and Orff approaches, highlight movement as a key means of early childhood musical development (Dalcroze, 1972). This emphasis on movement is also supported by Piaget’s view on the value of sensorimotor schemes and enactive representation in early learning (1936). Additionally, the Kodaly Method uses a developmental approach to music learning by introducing skills sequentially in accordance with the capabilities of the child (Choksy, 1999). Though not conceived as student-directed approaches, the Kodaly, Dalcroze, and Orff methods have been applied in collaborative learning environments with a focus on musical improvisation and exploration.

**Learning Theories in Music Education**

Howard Gardner proposed a cognitive account of music learning in his theory of multiple intelligences, which included a “musical intelligence” (1983). Gardner noted the focus in schools on two forms of symbol use: linguistic symbolization and logical-mathematical
symbolization, but he positioned musical intelligence as distinct from these ways of thinking. Gardner’s positioning of music intelligence as distinct from the other intelligences allowed his theory to be used by music educators to advocate the importance and value of music in education. A critical factor of Gardner’s (1999) theory is that of mental representation as a key dimension of cognition. Defined as the memory of an object or event, which is used to assess whether a perception is a representation of the object or event in question, the concept of mental representation has been claimed as a central concept in music skill-building in several cognitive theories of music learning (Lehmann & Davidson, 2006).

Another cognitive theorist, Edwin Gordon (1980, 1997), developed a sequential music learning theory based on the concept of “audiation,” which he defined as conscious activation that takes place when neuronal representations are activated in thinking, listening, creating, or music-making. Audiation is the cognitive process of mentally hearing music with the brain giving meaning to musical sounds when the physical sound is not present. Gordon’s music learning theory was divided into two basic categories: discrimination and inference, and involved eight levels of skills, such as recalling and performing music from memory. Gordon’s pedagogical idea that music learners should build aural and performing skills before being introduced to music notation are similar to the approaches of the Dalcroze, Orff, Suzuki, and Kodaly methods. Gordon’s learning theory has been critiqued for teaching different musical elements in isolation from each other. The alternate view is that learners focus first on an overview of the whole, followed by an in-depth study of the individual parts leading to greater understanding of overall concepts (Walters, 1992).

An early example of the impact of technology on music learning and instruction is seen in the Manhattanville Music Curriculum Program (MMCP). Established by Gordon and other
theorists in the United States between 1965 and 1970, the MMCP was an alternative educational model in music education designed to foster creative development through music with an emphasis on holistic musical understanding rather than skill development (Thomas, 1970; Willoughby, 1990). One aim of the MMCP was to address the lack of student interest in school music, particularly at the secondary level, compared with their engagement in music informally outside of school. This lack of engagement in school music was accounted for in terms of students reaching Piaget’s formal operation period in the later years of age 11 years and up (Walker, 1984). The MMCP employed a spiral curriculum, conceived by Bruner, with the focus of introducing new concepts in sequential and developmentally appropriate cycles. The MMCP positioned creating and performing music through group interaction as the central activities through which cognitive objectives took place. In addition to the collaborative format of MMCP learning activities, there was also a reflective component, including student discussion and self-evaluation of their performances. Another innovative aspect of this approach was that students were also encouraged to record their performances for further reflective discussion and analysis.

Along with this focus on reflection and collaboration in music learning, the MMCP included student self-evaluation of personal goals within the learning activity. The MMCP model was student-centered, with a focus on discovery rather than instruction (Walker, 1984). The role of the teacher in the MMCP model was to evaluate the effectiveness of the curriculum and make modifications and adjustments as required. Additionally, the teacher’s role was to act as a “facilitator of discovery” for the music students as opposed to the director of the learning or music-making (Walker, 1984, p. 30). The MMCP was an important part of the comprehensive musicianship curriculum reforms in North America.
Mental Representations and Ways of Knowing in Music

Recent applications of neurobiology to music education have focused on the fostering of mental representations as a central concept. Gruhn and Rauscher (2006) defined “learning” as the process by which one develops and differentiates mental representations, and hence “music learning” as the development of genuine musical representations that are characterized by different forms of encoding. Lehmann and Davidson proposed that the goal of music education is to enable students to form the mental representations necessary to enjoy and produce meaningful musical material (2006). In addressing the question of how to enable or teach learners to form these mental representations, the idea of “teaching music musically” (Gruhn 1997; Swanwick, 1999) was proposed. This idea involves advancing teaching strategies and learning approaches that promote the development of genuine musical representations by preparing both aural and oral skills in a continuous pattern. A very simple example of this would be hearing a rhythm and then clapping it back.

Research in music cognition suggests that mental representations are central to musical skill development and that those representations develop as a result of practice and experience. A number of studies have found that deliberate practice of a specific piece or performance is distributed in response to encountered problems, which could mean that students chose to practice as a reaction to immediate problems encountered in the music (such as a wrong note or rhythm) as opposed to adopting a more holistic approach to their practicing and musical development (Chaffin & Imreh, 1997; Hallam, 1995; Jorgensen, 1997; Lehmann, 1997). This reflective decision of how to allocate practice time requires metacognitive skills on the part of the musician and, therefore, learning to practice effectively is, in itself, a skill that needs to be acquired through deliberate teaching (Lehmann & Davidson, 2006). The concept of learning
how to practice effectively is a challenging one for young musicians to develop, since there is not one correct way to practice and students often assume that quantity of practice rather than quality will lead to better results. One way of supporting music students in developing this concept of effective practicing could be through the self-regulated learning processes of specific goal setting, monitoring and reflection.

Theorists have made connections between collaboration and music learning noting that many educators approach music learning as a solitary activity, through emphasis on individual practicing, but argue that more emphasis should be placed on group interaction and collaboration in school music classes because music is a collaborative practice. Sawyer offers a collaborative music learning model based on group improvisation with appropriate scaffolds to accommodate different learners and to allow all learners to participate meaningfully (Sawyer, 2008).

Arts PROPEL

An outcome of Harvard’s Project Zero, Arts PROPEL was a multi-year project that began in 1985 with the goal of “devising a set of assessment instruments to document artistic learning during the later elementary and high school years” (Gardner, 1989, p. 179). This project aimed to examine production (rehearsing, performing, improvising, composing, or constructing a work of art), perception (noticing connections and making discriminations within works of art), and reflection (thinking about the process of making or responding to works of art) in three arts forms: music, visual arts, and creative writing (Gardner, 1989; Winner, 1991). The Arts PROPEL project focused heavily on the role of reflection and the reflective process in music learning processes. To this end, one of the main assessments developed from this project was a portfolio that Gardner also called a “process-folio” meaning that this tool deliberately contained artistic works-in-progress as opposed to simply containing best artistic exemplars (Gardner,
With the goal of making assessment processes foster further learning, the development of the project-based Arts PROPEL assessments with an emphasis on reflection through portfolios attempted to bridge the gap between theory and practice by exemplifying a shift from “philosophical analysis and psychological experimentation to practical efforts in educational settings” (Gardner, 1989, p. 180). The two main assessment instruments that emerged from this research project, the domain project and the process-folio, were both rooted in reflective and inquiry pedagogies with an emphasis on open-ended student-selected problems (Davidson, 1992).

The Arts PROPEL project demonstrated advances in student-directed learning supported by authentic assessment tools including an increased focus on student self-assessment (Project Zero, 2014). The Arts PROPEL model had an impact on the continued focus on aspects of inquiry learning, such as reflection and open-ended outcomes, in music education.

The e-portolio and vocal wiki projects that are outlined in Chapters 3 and 4 of this dissertation were influenced by the Arts PROPEL project vision and goals. Certain central ideas of Arts PROPEL, such as student-directed learning and process-based assessments, can now be supported by more advanced technology tools with added dimensions of collaboration and peer exchange to continue the important work that began through Harvard Project Zero’s Arts PROPEL.

Innovations in Music Teaching

Because pedagogical approaches in music education have advanced the teacher-centered model as the norm, music educators are very likely to implement conventional teacher-led instruction, rather than student-centered learning approaches rooted in constructivist theories (Miller & Seller, 1990). This is particularly true in performance-based ensemble programs.
where the music teacher makes the choices regarding the value of the musical genres as well as the artistic decisions regarding aspects of performance. Researchers have raised questions and concerns about the misuse of authority and negative effects on the learners that can result from this didactic approach, led by an expert music teacher in the classroom or studio setting (Bartel & Cameron, 2004). Increasing shifts in philosophical views in the field of music education have also begun to influence pedagogical approaches in music education. The questioning of teacher authority, hierarchical prioritizing of certain types of music over others, issues of access, equity, identity building and multiple social perspectives in music education are currently being explored and challenged in the field. Though these critical issues do not form the central framework of this dissertation, certain aspects may be addressed as they relate to emerging pedagogical approaches and learning innovations in music education as related to this study.

Music education researchers and practitioners are beginning to challenge the “conductor-as-teacher” model as the dominant approach to music learning and are now exploring pedagogical approaches that are more student-centered. Innovative pedagogical models being explored typically involve one or more aspects of project-based learning that include collaboration (Lashbrook & Mantie, 2009; Lashbrook & Willingham, 2002), authentic assessment strategies (Beatty, 2000; Berg & Lind, 2003), technology-enhanced learning environments (Meyer et al, 2010a; Seddon & Biasutti, 2009; Smith, 2009), and collaborative learning approaches including peer-directed and group learning (Allsup, 2003; 2004a; Green, 2002; 2008). The next two sections review specific pedagogical approaches in music education: (1) the development of e-portfolios in music education and (2) technology-enhanced learning in music education.
E-portfolios in Music Education

There is a growing body of research on e-portfolios in music education. Previous studies that have focused primarily on the examination of e-portfolios in undergraduate courses and pre-service music teacher education programs serve to offer important perspectives for newer e-portfolio implementation projects. Much of the research on e-portfolios in post-secondary music education has addressed the themes common to portfolio research in other subject areas, such as whether constructing e-portfolios facilitates reflective practices and leads students to assess their own learning (Bauer & Dunn, 2003; Berg & Lind, 2003; Frazes Hill, 2008; Koops, 2008). The idea that reflection is a cognitive strategy that does not necessarily come easily to learners is supported by research in music e-portfolio integration (Bauer & Dunn, 2003; Berg & Lind, 2003; Draves, 2009). Additionally, certain technological advantages, such as the nonlinear nature of multimedia and the possibility of video and audio clips being incorporated into e-portfolios, have been cited as particularly beneficial to learners in the music context (Berg & Lind, 2003).

Several important studies in e-portfolio learning have been published focusing on the use of improving student metacognition with e-portfolios in both music education and other fields. Upitis et al. (2010a) outline an e-portfolio case study focusing on the music educational context of the private music teaching studio. Study findings showed that the e-portfolio, designed through the web-based ePEARL software, was effective in supporting student goals as they learned to play an instrument. Another recent study on teaching and learning with ePEARL in the elementary classroom setting examined if the e-portfolio could have a positive impact on the literacy practices and self-regulated learning skills of students (Meyer et al., 2010a). Study results supported the idea that teaching with ePEARL had a positive impact on student literacy and self-regulated learning skills when the tool was used on a regular basis and integrated into
classroom instruction. The emphasis on deep integration into the curriculum needed for the positive learning impact of the technology is an important aspect of these findings as it also relates to inquiry learning and design-based research.

In a second study, Meyer et al. (2010b) took this idea of classroom integration a step further when they investigated teachers’ experiences with the e-portfolio that were motivators for, or barriers to, their use in order to better understand the challenges that come with the integration of a new technology into curriculum. Recommendations for effective technology integrations from study results included having sufficient technical infrastructures to support teachers both in the classroom and the school context overall as well as student and teacher access to functioning computers with maintenance by technical support professionals. Another recommendation for implementation was that teacher training focus more on why using educational technology is important, through clear supporting theory and research, rather than simply on how to use it (Meyer et al., 2010b). This becomes especially important with the student-centered focus of many technology implementations where the teachers involved need to not only use the new technology, but also to adapt their pedagogical styles to move beyond teacher-centered methods of instruction.

Identity Development

Another area of music education research is that of identity development in the student musician through e-portfolio learning (Morrison, 2004, 2010). In the past, music educators have been critiqued for rarely engaging students in the types of creative activities and dialogues that contribute to the construction of their individualized musical selves (Woodford, 1997). The development of identity and a sense of self as a musician are important processes for young musicians, with the goal of inspiring lifelong autonomous musical learning and enjoyment.
Further, as related to the context of this study, it is important to provide secondary school students with opportunities to reflect and to shape their own musical identities since they are at a key time in their lives as “identity seekers” (Jones & Perkins, 2006, p. 92). Music has been recognized to play a key role in establishing identity (Campbell, 1998; Cornett & Smithrim, 2001). Reflection has been credited as a means of fostering self-expression and musical identity development (Reid, 2002). Reflections serve to encourage learners to see connections in their own work and begin to view themselves in new roles (such as “musician”) leading to agency and further motivation for learning (Clark, 2010; Morrison, 2004, 2010; Rickards et al., 2008).

**Technology-Enhanced Learning in Music Education**

Recently, scholars have studied the role of technology-enhanced learning environments, previously referred to as computer-assisted instruction (CAI). Many of the studies conducted in the past two decades have focused on measuring the effectiveness of CAI in music instruction through quantitative approaches with a focus on performance achievement (Kassner, 1992; Linklater, 1997; Orman, 1995). A typical early example of CAI research with a performance achievement focus is Linklater’s study on the comparative effects of home practice using three different kinds of cassette-tape models on the performance achievement of beginning clarinet students (Linklater, 1997).

Not all research involving technology-enhanced music environments focused purely on the effectiveness of instruction leading to performance achievement. Many of the CAI studies had similar results of increased motivation derived from the autonomy of students in these technology-enhanced environments, including an examination of piano performances using live accompaniments, no accompaniments, or “intelligent digital accompaniment” (Sheldon, Reese, & Grashel, 1999) and the use of CAI (Music Ace 2 software) to teach rhythm skills (Smith,
Additionally, some of the early studies focused on the effect of CAI on both performance achievement and student attitude (Kassner, 1992; Orman, 1995). Yet, even with the addition of technology tools, the role of teacher as central expert was retained within many of these studies.

The traditional approach to music instruction involves the teacher in a “performer” role model, and primary source of information concerning musical knowledge and skills. Even with the addition of CAI, if primary emphasis is still placed on the teacher for knowledge development and expert instruction, then the traditional teacher-oriented learning situation continues to be perpetuated in music education. In more recent years, the research on CAI in music education has begun to shift in terms of challenging the role of the teacher with the introduction of technology scaffolding. Seddon & Biasutti’s work investigated the possibility of learning to play an improvised 12-bar blues on keyboard in an asynchronous e-learning environment and included an investigation into participant approaches to and reflections on this learning experience (2009). They identified five distinct learning behaviours that they construed as learning activities: instruction, copying, practising, playing and evaluating (Seddon & Biasutti, 2009, p. 191). These learning activities are aligned with the informal music learning practices of rock and pop musicians that Lucy Green introduced to secondary school music students in her study (Green, 2008). Seddon and Biasutti noted some of the possible issues with beginning musicians learning in an asynchronous e-learning environment (that could be corrected by a teacher in a face-to-face learning situation) such as the development of poor posture leading to poor technique as well as poor sound production perhaps due to poor technical skills (2009, p. 199). However, they asserted that the advantages provided by the e-learning environment outweighed the disadvantages. In particular, they argued that the high levels of enjoyment and motivation expressed by the study participants resulted from feelings of
autonomy reported by participants (2009, p. 200). The feelings of autonomy in Seddon and Bia
cutti’s study lend support to findings from other studies that recommend higher levels of
student autonomy and less teacher direction in music learning situations (Green, 2002, 2008;
Seddon, 2006).

The recommendations for higher levels of student autonomy and more development of
metacognitive skills in music learners continues to grow in the field and is beginning to be
reflected in new technologies being integrated into music educational institutions. The Royal
Conservatory of Music, Canada's largest and oldest independent arts educator, has recently
launched iSCORE, a web-based practice and communication tool, for use through their private
teaching studios across the country. According to the Royal Conservatory of Music website
(Royal Conservatory, 2014), iSCORE is designed to help motivate students to take responsibility
for their overall music learning by changing the way that students use their practice time. The
design features of this technology tool include a home page area where students can create a
profile with their goals, abilities to record practice sessions with an embedded recorder,
interactive text areas that facilitate plans and reflections, and links to composition and
sequencing tools. These design features are very much in line with inquiry-based learning
pedagogies including the fostering of self-regulated learning. It is important to note that the
iSCORE tool was designed to be used by individual students in studio lesson settings; this would
typically involve a music teacher and an individual music student studying an instrument or
voice as opposed to being used in the school classroom environment.

Both the development of e-portfolios as an assessment tool in music learning as well as
the expansion of technology-enhanced music learning environments emphasize the value of
reflection within music teaching and learning.
Music Education for the 21st Century: The Impact of Technology

Conceptual frameworks for 21st century skills have been put forward by numerous authors and organizations, and there are many overlapping ideas in these frameworks. Much of the literature on 21st century learning skills focuses on the central component of creative problem solving through the use of digital technologies (Mayrath, Clarke-Midura & Robinson, 2012). In fact, the use of technology has emerged as an important aspect of both 21st century learning skill development and assessment. The Ontario Ministry of Education created website, EduGAINS, lists the following pedagogical approaches as important in supporting 21st century skills: engaging students as partners in their own learning, using technology to engage learners, and emphasizing higher-order skills such as critical thinking, communication, collaboration, creativity, and entrepreneurship (EduGAINS, 2014).

According to Collins and Halverson (2009), instruction in the 21st century “knowledge era” is moving towards “interaction” as a key learning process. This interaction could be with peers in the classroom, with rich technological environments or with other learners in a variety of online contexts. This focus on interactive, lifelong-learning reflects aspects of the apprenticeship model of learning, where teachers offer guidance and feedback throughout the student’s engagement in individualized learning tasks.

In a chapter outlining ideas for music curricula for the 21st century, Seddon (2004) presents his vision of how music e-learning environments will be a central part of technology enhanced learning in music education. He suggests that music students, music teachers and professional musicians will become part of online communities and interact in various ways to facilitate learning and collaboration. For example, if a music student wishes to develop a skill that is outside the experience of their teacher, they would enter a music e-learning community
and interact with others who share similar musical interests and who could mentor them or collaborate with them in building these musical experiences. Seddon also notes that music teachers will have to be flexible in their role and move from instructor to facilitator as is required by the learning situation. Seddon’s vision aligns with Collins and Halverson’s focus on collaboration and interaction with a community of learners in a variety of online contexts as a key learning process of the 21st century (2009).

New Ways of Engaging with Music: “Net Geners”

Discussion has emerged regarding the influence of technology on how music is currently created, shared and experienced. In *Grown Up Digital*, Tapscott (2009) introduces the children of baby boomers as the Net Generation or “Net Geners” because they are the first generation of learners who have grown up in a digital world. Tapscott describes Net Geners as multitasking “active initiators, collaborators, organizers, readers, writers, and authenticators” who do not just observe, but participate (p. 21). He theorizes that the new ways that young people are discovering music through this digital world is significant to their development in terms of social values and interactions. In response to the notion that young peoples’ preferred mode of communicate is instant messaging, Tapscott observes that this generation may be even more social because they are interacting with each other more through the technology as well as in person. Tapscott (2009) also notes that Net Geners are “not waiting for orders” from authorities, but are instead using technology to create their own content, collaborate with others, and build communities. In considering education, he argues that the transmission model of instruction, with the engrained role of teacher as all-knowing expert, does not make sense for these digital natives who have grown up collaborating and exchanging ideas with others around the world through social media.
The idea of Net Geners “not waiting for orders” is also emphasized by Collins and Halverson (2009), who propose learner control and customization as part of their enhanced capabilities for educating learners through technology. Young people are becoming less willing to learn what someone else thinks they should know since they have been exposed to technology allowing them choices and control in other areas of their lives. This new generation of students wants to decide what is of value to them in their learning and how they might customize their learning to best suit their interests. With the relatively ubiquitous technology tools available to them, they are likely already engaging in this type of inquiry, discussion, and investigation in their lives outside of formal schooling.

**The Changing Role of the Teacher**

Pedagogical innovations in the learning sciences, such as inquiry-based instruction, have been advanced to help shift the emphasis away from teacher-led to focus on student interactions and rich, inquiry-oriented activities (Linn & Eylon, 2006; Quintana et al., 2004). New roles for the teacher are often described as an integral aspect of these efforts (Blumenfeld et al., 2000). An interesting dimension of this shift may be related to the technology-enhanced environments that are prevalent within inquiry models, where teachers no longer have complete control over delineating knowledge and the technology itself begins to play a role in guiding student activities (Slotta & Linn, 2009).

In a music context, Green’s (2008) study of new classroom pedagogies has provided some illustration of what this new teacher role might look like in practice. Her study engaged students in a collaborative project related to popular music learning, involving open-ended learning outcomes, a high degree of student autonomy and a low level of teacher direction. The
teacher’s role involved introducing and getting the task going at each stage and then stepping back to observe and to learn along with the students. At the outset of instruction, teachers in this study expressed fears in terms of not knowing what to expect as well as being perceived as lacking structure and not having control over the learning process. However, by the end of the instructional intervention, teachers had started to adjust to their new roles which involved standing back, observing, guiding, and helping the students to achieve the objectives that they had set for themselves (Green, 2008). There was an acceptance of this new role for the teacher and how this role could facilitate student learning in a different way. Teachers in this study were also asked to support the students’ perspectives and the goals that students set for themselves and, after they had done this, act as “musical models” through demonstrations to help the students reach the goals that they had set for themselves (Green, 2008, p. 24). In reflecting on the changes in the teacher’s role, students in Green’s study indicated that they benefited from the project since they were given the autonomy to direct their own learning practices. This powerful notion that students are capable of progressing even in the absence of direct teacher-led feedback or instruction has exciting implications for music education in the possible application of inquiry-oriented approaches like reflection and peer exchange.

Lebler (2007) developed a similar pedagogical approach in his creation of a scaffolded, self-directed learning community called the “master-less studio”. In this learning environment, music students at the undergraduate level were challenged to self-direct their own learning through the “Popular Music Production program,” a major study area involving composition and performance. Students developed their performance abilities and determined the direction of their creative work through interaction and collaboration within a community of practitioners. The role of the teacher within this model was to observe and provide feedback as a member of
the broader learning community as opposed to engaging in individual skill training or the direct transmission of knowledge. The development of reflective practice was also important to Lebler’s model, as the students worked through a cycle of recording their performance sessions, then critically reflecting on them, in order to make adjustments and record again. Conclusions in this study demonstrated that greater student autonomy and self-motivation resulted from the process of reflection on performance as well as peer-based assessments (Lebler, 2007).

It is no coincidence that both Green (2008) and Lebler’s (2007) studies were situated in popular music contexts as opposed to classical ones. Both researchers recognize the learning characteristics implicit in the popular music context as contrasting with those of other genres that have been the basis of formal music education for many years. Green (2002) uses informal music learning practices to describe young musicians who teach themselves by listening to, watching and imitating musicians around them and she connects these practices to popular musicians and their methods of musical learning. Formal and informal music learning practices are not considered to be mutually exclusive, but instead as processes on a continuum, because learners often encounter aspects of both in learning situations (Green, 2002; Folkestad, 2006; Westerlund, 2006; Wright, 2008).

An important development in bringing informal learning practices into formal school contexts is the launch of Green’s (2008) Musical Futures project here in Canada. Musical Futures Canada is described as a series of approaches that can be personalized by teachers and that is based on the belief that music learning is most effective when young peoples’ passion for music is acknowledged and deliberately integrated into classroom activities (Hutchison et al., 2013). Similar to the recommendations of the Meyer et al. (2010b) e-portfolio study, this project recognizes the important role that music teachers have in the meaningful integration of this new
pedagogical approach. Through the *Musical Futures Canada* website, music teachers have access to resources such as rock-band arrangements for use in classrooms and, perhaps more importantly, can join a community of colleagues to discuss these approaches and share ideas through the various *Musical Futures Canada* social media offerings. The *Musical Futures Canada* project researchers also actively promote and offer interactive workshops where music educators have a chance to work with current music students involved in the pilot schools to experience what these approaches can be like when enacted. I had the opportunity to attend a workshop at the 2012 Ontario Music Educators’ Association Conference to experience the passion that the music students involved in this project displayed. In this student-centered environment, music teachers like myself had the opportunity to sit in on a rock band group session with other teachers to work on a popular song performance. The music students took on the role of their teachers and acted as guides who were there to support us when we needed encouragement or had a musical question but did not direct the music. While this workshop situation was artificial as compared to a classroom context, it was interesting to see how the students stayed very much on the sidelines in their imitations of their *Musical Futures Canada* teachers. Having taken on the musical role of the drummer for a rock band group working on Adele’s “Rolling in the Deep,” I was definitely out of my musical comfort zone! It was interesting how the students (in the role of teachers) encouraged me through some of Green’s (2002) informal music practices such as listening to and collaborating with peers (the other teachers in the rock band) and making musical decisions collectively as well as copying an “expert” performance (in this case, the “real” drummer in Adele’s version of the song). These informal music learning practices are very similar to the previously outlined learning processes
in scaffolded inquiry that lead to self-directed learning including comparing ideas with peers and searching for ways to make learning connections (Slotta & Linn, 2009).

**Changes in Assessment Practices**

In the late 20th century, educational theorist Elliot Eisner (1998) expressed the need for new forms of evaluation, moving beyond the multiple-choice test, that can handle the “uniqueness of outcome” that comes hand in hand with the diversity of students in the arts: “The work of art – by which I now mean the act of creation – does not follow an unalterable schedule but is a journey that unfolds” (p. 84). Thus, with shifts in pedagogical approaches there should also be a corresponding change in assessment practices. In particular, inquiry-oriented instruction typically advances the notion of assessments that serve to foster student learning as much as they do to measure it (Mayrath, Clarke-Midura & Robinson, 2012). There is an emerging interest in many fields, including music education, in the value of self and peer assessment as well as reflection-based assessments, such as portfolios, as opposed to the memorization and regurgitation of musical facts. More than 10 years ago, in a study examining the state of music education in Ontario, Rodger Beatty (2001a, 2001b, 2001c) recommended that more resources on assessment and evaluation be developed for secondary music teachers to enable better assessment of student growth in music education. He also noted that the focus of assessment in music education in Canadian schools has been product-oriented and offered authentic assessments or performance-based assessments as a way to include the process of learning in evaluation (Beatty, 2000). Authentic or performance-based assessments focus on the process of learning as well as the outcome and are often open-ended problems similar to inquiry-based learning approaches. Authentic assessment tasks foster the use of higher order thinking skills among students as well as encourage them to make their own connections and draw
inferences from their work (Farrell, 1997). Authentic assessments can include self-assessments, peer assessments, group assessments, portfolio assessments, and teacher-created assessments such as open-ended problem-solving tasks, individual or group performances, projects or exhibitions, research papers, and concept maps (Beatty, 2000).

Essential skills in education include more than rote memorization of facts, but are now considered to focus on problem-solving including the application of skills in new settings and the transfer of knowledge to different situations. Collins and Halverson (2009) echo the need to move toward performance-based assessments in order to support the vital goals of customization, interaction, and learner control all of which are part of the goals of the technology design outlined in this dissertation study.

**A Role for New Technologies: Supporting Reflection and Collaboration**

The development of new technological tools opens the door for creating new learning environments in music classrooms that can support novel pedagogical applications. However, it is vital that a theoretical perspective guides the development of these learning environments, as opposed to simply implementing new technologies “for their own sake,” without consideration of pedagogical goals. As previously outlined, teachers need support to move beyond simply adopting new technologies to adopting new pedagogical approaches where technology plays a supportive role within an interactive learning environment (Green, 2008; Lebler, 2007; Meyer et al., 2010a). Collins and Halverson (2009) outline a series of enhanced capabilities for educating learners through these technological innovations, outlining three forms of reflection that can be enriched by technology: reflection on process, comparison of performance with the performance of experts, and comparison of performance with a set of evaluative criteria.
An example of how the three forms of reflection proposed by Collins and Halverson might be applied in a technology-enhanced music classroom can be illustrated through use of recordings that can be done through computers as well as handheld devices such as Smartphones. Digital recordings of practice sessions and performances have the capabilities of providing immediate feedback to student musicians, allowing for self-assessment skills to be engaged and developed through the process of listening, peer discussion, and individual reflection. Through the use of recordings, students are provided opportunities for reflection on their own performance processes including technical skills but moving beyond technique to artistic decision-making and interpretation of music. This immediate feedback through recordings could allow teachers greater insight into student learning processes leading to more effective learning strategies and approaches. Music students could also compare their recordings with the performance of “experts” (Collins & Halverson, 2009) – both through working with peers as well as listening to and imitating professional musicians (e.g., as downloaded from YouTube). Students could also gain valuable skills in critiquing their own performance processes using criteria that are similar to those used by professional musicians. Finally, the reflective skills developed through listening, discussion, and critical analysis have potential to inspire the development of metacognitive proficiencies and student self-directed learning.

The research reviewed above offers some productive recommendations to inform the design of innovative pedagogical approaches for music education. In particular, instructional methods or tools that emphasize collaboration, peer exchange, and reflective opportunities should allow students to become more actively involved in their own musical learning processes. This shift in moving to create a student-centered music environment as opposed to a conductor-
centered classroom could bring changes both in the pedagogical approaches of music educators and the music learning experiences of students.

**Reflection and Collaboration**

Drawing on the literature from social constructivist theories, inquiry learning, and music education research, there is an emerging thread of pedagogical approaches with lower levels of teacher-direction, higher levels of student autonomy, and more open-ended outcomes. Additionally, the studies and theories reviewed that included aspects of reflection and collaboration illustrate how instrumental these processes are to student learning. This is consistent with the views in music education that support the learning processes of reflection (Berg & Lind, 2003; Gardner, 1989; Meyer et al., 2010b; Walker, 1984) and collaboration (Green, 2002, 2008; Lashbrook & Willingham, 2002; Lebler, 2007; Seddon, 2004) as significant in student engagement and in music teaching and learning.

If collaboration and reflection are such valuable processes in music teaching and learning, any technology-enhanced learning environment that promotes these processes could be an important means of engaging student musicians. This idea provides the essential motivation for this dissertation research, which seeks to design, evaluate, and re-design a new wiki-based learning environment that engages secondary-school music students in collaboration and reflection. The following chapter details the specific study design and methodology used in this research.
CHAPTER 3: Methodology

The aim of this research is to examine student engagement through collaboration and reflection in a technology-enhanced music learning environment. This chapter outlines the methodology used to explore the research questions as outlined in the first chapter. During the time of my doctoral studies, I was fortunate to be teaching vocal music in a setting in which I could experiment with technology-enhanced methods. This proved to be an appropriate context in which I could examine the ways in which I could manipulate the technology, to observe how students negotiated technology in a music education setting, and what effects this might have had on their musical learning and skill development. Throughout my early years of teaching, I found myself developing e-portfolios and using them in my teaching context as process-based assessment tools. Thus, during the time in which this research was being framed, I was already somewhat versed in the use of e-portfolios within my vocal classroom and treated those early experiences as an important form of pilot research. This pilot research phase allowed for the three main dimensions to be selected as the basis for analysis (performance, collaboration, reflection) as well as for the planning and creating of a technology-based intervention that would strengthen these three dimensions.

Design-Based Research

This study employs a design-based methodology to examine the development of self-directed learning in secondary music education through the integration of an interactive wiki tool. Design-based research has been defined as an appropriate method for studying the improvement of educational practices through design, development, and implementation within authentic settings (Wang & Hannafin, 2005, p. 6). The design-based research method was developed by Brown (1992) and Collins (1992) in recognition of the need to study learning in
context. Since design-based research is rooted in authentic activities and the design processes themselves are included in the investigation, the results of such research can be seen as having greater external validity than those developed in laboratory settings (Greeno, Collins, & Resnick, 1996).

According to Collins, Joseph, and Bielaczyc (2004), design-based research was developed to address several issues central to the study of learning, including the need to address theoretical questions about the nature of learning in context, the need for approaches to the study of learning in authentic contexts rather than a laboratory, and the need to obtain research findings from formative evaluation. Design-based research is an appropriate methodology for this study, since new technological and pedagogical innovations were studied within the context of a vocal music classroom. Design-based research also typically involves an iterative cycle that includes design, implementation, analysis and redesign (Design-Based Research Collective, 2003). Along with this flexible design revision, there is a focus on capturing social interactions and the deep context of learning, as opposed to controlling variables and isolating effects (Collins, Joseph, & Bielaczyc, 2004; Barab & Squire, 2004). A key distinction that separates design-based research from other methodologies is the focus on understanding the “messiness of real-world practice, with context being a core part of the story and not an extraneous variable to be trivialized” (Barab & Squire, 2004, p. 3). This focus is met in the current study through qualitative coding of wiki content, and case study descriptions that present a deeper exploration of the perspectives and experiences of three students. The methodological emphasis on rich content compliments the action-oriented nature of the work (i.e., since I am the researcher as well as instructor), where a deeper narrative about student and teacher experience is traditionally sought (Bresler, 1995).
Action Research

The methodology of this study was also shaped by the tradition of action research. Indeed, this study is somewhat unique in its adoption of a design-based methodology that is also informed by an action research perspective. Conway & Borst define action research in music education as inquiry that is “designed by teachers to make changes and affect teaching” (p. 3, 2001). Action research aims at the direct improvement of curriculum and learning within a particular classroom and, in the music education context, has been credited as accessing a critical viewpoint from which the teacher/researcher can reflect (Bresler, 1995).

In this study, I had the opportunity to arrive at new understandings about my own pedagogical approaches, as an instructor, through reflection brought about by the research. This reflection took the form of a teacher/researcher journal, and observational data that are common to action research (Cochran-Smith & Lytle, 1990). The case studies in Chapter 5 of this dissertation make use of narrative formats of representation typical of the action research tradition. The case studies typify the rich description that can be offered because of my unique position as the teacher/researcher where I had the opportunity to spend much time in class with the students involved in my study over several years.

Teacher-as-Researcher

Rooted in action research, the notion of teacher-as-researcher is acknowledged in recent literature on educational reform, which encourages teachers to be collaborators in revising curriculum, improving learning environments, professionalizing teaching, and developing policy (Cochran-Smith & Lytle, 1990). This idea of participant researcher is also prevalent in design-based research, which studies the process of engagement between the teacher and students where the researcher can fill the role of the teacher (Steffe & Thompson, 2000). In many design
research contexts, researchers are expected to intervene during the study where possible and to use these interventions as opportunities to examine learning. Design researchers have noted that it is through the intervention process that theories and models are developed and advanced for use in other contexts (Cobb et al., 2003).

As a music educator, I have been teaching vocal music at the secondary level for more than 10 years and I am used to being immersed in technology in this particular teaching context. As a researcher, I have been exploring the use of portfolios in music education and integrating e-portfolios into my vocal music classroom for many years. My teaching background and pedagogical explorations in portfolio integration paved the way for this dissertation study focusing on reflection and collaboration through the wiki technology integration.

**Study Design**

This study focused on the iterative design, implementation, and evaluation of a wiki technology environment within a music education context. The main parts of this study consisted of adding an intervention (i.e., the wiki environment) to several vocal music courses followed by analysis that led to design revisions, and then running the study again in a second iteration. Design-based research methodology was used in order to allow for analysis of the wiki design and for ongoing revisions to the design within the music classroom context. This study involved a pilot phase followed by two iteration cycles and, at the end of each cycle, data was collected and analyzed to inform the design changes of the wiki tool for the following iteration.

Each design phase lasted for approximately 12 weeks, was embedded within the regular class curriculum, and occurred within regularly scheduled music classes. The pilot run of the e-portfoli o tool also occurred during a 12-week period between September and December of 2011. The first iteration of the redesigned wiki tool occurred between March and June of 2012 and the
second iteration occurred between September and December of 2012. During each of the two study iterations, the course curriculum focused on several different musical activities, including performing as a soloist, performing within a vocal ensemble, and songwriting. These activities varied from one instructional cycle to the next, partly in response to emerging features of the wiki innovation, and also depending on the point in the school year when the implementation occurred, either the fall or spring term. However, the general curriculum emphasis on performing and creating music remained the same throughout each cycle.

Participants

This study involved a total of 50 secondary school music students in five different vocal music classes, consisting of a mix of grades 10, 11 and 12 students, at an independent secondary school (described under Research Setting, below), as well as the teacher/researcher.

All of the students involved in this study had chosen to take vocal music as an elective course in their secondary education. In all cases, students contributed to the wiki tool as part of their curriculum requirements within the vocal music course. The first iteration involved a total of 31 vocal music students with the following breakdown: nine grade 10 students, 10 grade 11 students, and 12 grade 12 students. Due to timetabling conflicts and school scheduling, these students were divided into three different vocal music class sections consisting of a grade 10 music class and two grade 11 and 12 combined vocal music classes. Throughout this study, the grade 10 students are referred to as “Upper” vocal class and the grade 11 and 12 students are called the “Senior” vocal class. These grade-level names are a specific designation of the school.

The second iteration of the study involved a total of 32 vocal music students: 16 grade 10 students, seven grade 11 students, and nine grade 12 students. These students were divided into two vocal music class sections consisting of a grade 10 class and one combined grade 11 and 12
vocal music class. Because the design cycles of this study took place over two school years, a portion of the students - those who took two years of vocal music - were a part of both iterations. A second group of students, who were not yet taking vocal music, who left the vocal music program after one year, or who graduated after the first iteration, were only a part of one iteration of the design cycle. These two unique groups of study participants, as well as the entire collective of participants and their experiences are further addressed in the next two chapters of this study.

Nearly all of the students enrolled in grade 10 to 12 vocal music had taken at least one music course in the past or had a keen interest in developing their vocal skills. I filled the role of teacher/researcher for all iterations, including the pilot study and was the only vocal music teacher to teach these classes and sections during the data collection period.

**Confidentiality**

Due to the unique context of this study and the relationship between myself as the teacher/researcher and the students, confidentiality was an important ethical consideration. Letters of consent for all student participants and their parents (see Appendix A) clearly described the teacher/researcher role and the participants’ right to withdraw at any time. Students also gave letters of consent to another faculty member at the school, as opposed to returning the letters to me, to ensure complete ethical distance. At no time during the music course, while evaluations and assessments were ongoing, was I aware of which individual students were or were not participating in the study. All students participated in the vocal wiki as a part of the course and so this was not an identifying factor. Focus group interviews were also transcribed and analyzed after final marks had been submitted for the vocal music courses to protect student participant identities. Additionally, all student participants were assigned a
pseudonym throughout the data analysis process to ensure continued confidentiality. The name of the school is also deliberately not mentioned in this dissertation. All references to the school or to other students that occurred during focus group interviews were eliminated during the transcription and replaced with non-identifying words or pseudonyms.

**Research Setting**

The setting for this study was an international independent school located in the Greater Toronto area. This private co-educational day and boarding secondary school has been providing a challenging curriculum for students in grades 7 through to grade 12 for more than 100 years. The school offers a four-year liberal arts secondary school program with extra offerings such as a Global Leadership Diploma option and Advanced Placement (AP) courses. The school is an accredited independent school with a curriculum guide that follows *The Ontario Curriculum* (Ontario Ministry of Education, 2010a, 2010b) with additional experiential learning opportunities and academic enrichments offered. The student population of the school is culturally diverse with more than 200 international students from 35 nations with the entire student population at 750 students. The student body is divided into day students (475 students) and boarding students who live on campus (275 students) with all grade 12 students being required to live on campus for their graduating year.

All students are required to participate in mandatory co-curricular programs outside of class time in the areas of arts, service, and athletics. There is an equal value and emphasis placed on student involvement in the three areas of arts, service, and athletics, and students are expected to embrace this well-rounded approach to their education. This contrasts with other school programs where students can choose to be more focused in an area of interest such as athletics or music. The arts programs offered both as academic courses and extra-curricular programs are
very diverse offerings based in the areas of visual art, music, dance, and drama. Students are required to take either visual art or music in grades 7 and 8 as well as one more mandatory arts course (visual arts, music, dance, or drama) in their grade 9 year. Beyond grade 9, the arts are offered as elective courses for students all the way to grade 12.

The music program is divided into four different streams from which students may choose: vocal, strings, instrumental, or jazz. With a strong emphasis on performing, the music program focuses on developing musical literacy through performances, aural skill development, and creative activities. Guest artists visit the music classes several times a year to work with students on specific musical units, such as choreography for musical theatre performances in the vocal class. There are also various co-curricular musical options for students to choose from outside of their music classes including two choirs, concert band, jazz band, guitar club, and orchestra. This is a relatively large music program with many different offerings run by four music specialists in the areas of strings, vocal, instrumental, and jazz music. The students involved in this study were all involved in the vocal music program as an academic course, not necessarily as an extra-curricular activity, although many of these students did engage in music as an extra-curricular as well as outside of school.

The school setting is an e-school where technology is an integrated part of all academic courses including arts courses. The school has placed a high value on the integration of technology for both teachers and students, with many course activities occurring online. As part of school enrollment, each student receives a tablet laptop; computer competencies are taught through academic courses with the goal that all students become quickly comfortable with the integration and use of technology. Students are expected to complete online learning modules in various subjects and grades throughout their secondary school years. For example, the
compulsory grade 10 Civics course is taught in a completely online environment for all students. Along with using technology as a tool to organize and complete required coursework, interested students have opportunities to engage with technology in additional creative ways through creating films, using Photoshop, and designing websites. There are also popular extra-curricular clubs organized around online gaming environments. The school has an information technology department that supports students and teachers in their technology use and classroom integration.

**Music Curriculum Goals**

At this independent school, vocal music courses are taught at each grade level offered at the school (grades 7 to 12) alongside co-requisite music courses in strings, instrumental, or jazz music. The four music streams - instrumental, jazz, strings, and vocal - share the same course code and curriculum content in terms of music theory, music history, and performance requirements, all of which are guided by the Ontario Secondary School Curriculum. The music curriculum at the Upper and Senior levels consists of performance studies and creative enrichment units including technique, aural skills and performance skills, as well as studies in music theory, music history, composition, and improvisation. As opposed to units that occur in a linear or chronological order, the units in the music courses are intended to be studied simultaneously through integrated activities such as performing, analyzing, listening and creating music. Because the main difference in the four different music streams at the Upper and Senior levels is the performing instrument, music teachers are given autonomy to organize units of study around specific performance repertoire. For example, the vocal music students might be engaged in a popular music unit involving a variety of aspects including listening, analyzing, performing and creating popular music, whereas strings students in the same grade might be working on a unit focused on string music of the Baroque era.
There are four music teachers at the school and each teaches his or her respective area in collaboration with the others in the music department in terms of course curriculum content. There are differences in performance content because the music classes each perform their own repertoire. Because course units are often organized around performance repertoire, there is also flexibility around specific methods of course organization and pedagogical approaches. Therefore, I had the autonomy to design and integrate the vocal class wiki tool into the Upper and Senior vocal streams as a part of their course curriculum without having to require the other music streams incorporate the same approach and tool.

My guidelines from the school administration were that the technology design for this study had to fit within the school’s performance-based music curriculum. Thus, I did not have the independence to make major alterations to the music course curriculum, but I could alter my pedagogical approach to align with inquiry-based learning approaches when considering the design integration.

During both iterations, the Upper and Senior music classes met three times a week for a one-hour class totaling three hours of in-class time per week. There is an expected homework component to the school curriculum and, in the area of music, practicing instrumental or vocal techniques and repertoire is considered part of this homework. Although time was frequently given in class for introduction of assignments and reflective writing, the vocal class wiki was designed so that activities such as listening to ensemble recordings and responding through reflection and analysis could be completed outside of class time or during required homework time.
Pilot Study: E-portfolio Tool

The pilot phase of this research focused on the reflective tool that was already being used in the vocal music courses before the dissertation study began. This reflective tool was an e-portfolio model that I had developed over several years, with the main goal being to foster reflective skills in student musicians. The e-portfolio tool included several structured elements such as a vocal biography assignment, self-evaluation of student musical progress and skills, goal development, and three or four reflective portfolio entries depending on the student grade. The e-portfolio tool was carefully designed to include elements that nurture the reflective process (Clark, 2010; Davidson, 1992; Desmet et al, 2008; Winner, 1991; Yancey, 1996) including those that can be enhanced by technology, such as reflection on process and comparison of performance using technology tools, as defined by Collins and Halverson (2009). Drawing from Brown’s experiential learning portfolio model (2002), the e-portfolio tool had elements of choice encouraging students to actively participate in identifying learning outcomes and in expressing themselves.

The pilot project involved nine grade 10 students, 10 grade 11 students, and 12 grade 12 students, in three different classes. The pilot phase ran from September to December 2011 during a 12-week period. The e-portfolio was structured to match curriculum goals in the vocal music course. The students began by writing their vocal biographies at the beginning of the year followed by a self-evaluation of their musical skills. They then worked on their goals for the first term, which ran from September to December, outlining where they wanted to focus their musical growth and development. The self-evaluation and vocal goals were all created by the students and linked directly to musical development skill areas such as vocal performance, theory skills, aural skills, and vocal technique. After these initial aspects of the e-portfolio, the
students then completed monthly reflections on musical events of their choice. These ‘musical events’ did not necessarily have to be a culminating event such as a performance, but could be anything that they felt demonstrated their progress and influenced their musical development. Some examples of musical events that students chose to highlight ranged from effective or frustrating practice sessions to attending a concert to performing either as a soloist or in an ensemble. Students were given the instruction to link their reflections back to their initial musical self-evaluations as well as to their vocal goals to foster reflection on musical progress. It is important to note that the e-portfolio was a process-based assessment tool with an emphasis on individual student reflection and that, during the pilot phase, there were no specific collaborative aims to the assignment.

**Pilot Phase: Outcomes**

As outlined in the literature review, there are many potential learning benefits for students through the use of portfolios. Many of the cognitive processes involved in scaffolded inquiry, such as comparing ideas, looking for ways to make connections, and seeking understanding of problems, are also present in the e-portfolio reflective thinking processes. Further, through the e-portfolio tool, student learning and thinking became visible in their artifact choices and written reflections. Finally, in the e-portfolio process, learners were challenged to develop personal learning goals and employ agency through the process of reflecting on these goals (Yancey, 1996). These pedagogical ideas provided the rationale for the e-portfolio design that was explored during the pilot phase of this research.

As a result of using the e-portfolio tool for one academic term, I became convinced - as an educator and a researcher - that the approach offered some clear affordances for supporting reflective practices of both students and teacher. Firstly, e-portfolio tools could allow for the
development of individual reflective learning skills, given that the overall focus of this process-based assessment tool was individual student reflection. The e-portfolio tool also allowed teachers to get to know the students on a deeper level, both in terms of their personal musical goals and also their individual musical influences and preferences (Clark, 2010; Morrison, 2004, 2010; Rickards et al., 2008).

I noted in my research journal that the students frequently discussed and revealed more musical opinions and musical self-analysis in their vocal e-portfolios than they verbally expressed in face-to-face classroom settings. Further to this, I noted the strong building of student musical self-identity through elements of the e-portfolio design such as the vocal biography. Students began to view themselves as “singers” and “musicians” and started to articulate a sense of ownership in their musical learning after writing their vocal biographies and vocal goals. Finally, the element of choice that was built into the e-portfolio assignment allowed students to take more ownership in their musical learning since they were choosing what to include in the e-portfolio as reflective events and artifacts. Because it was up to the students, not the teacher, to choose what mattered most to them in their musical learning process, the e-portfolio allowed for the development of student-directed learning and agency in learning. Due to this emphasis on student choice in the e-portfolio assignment structure, the look of the e-portfolios differed between students because of the ways that they chose to use photos, colours, and images in their overall e-portfolio design. This idea is reflected in the two student e-portfolio exemplars in Figures 1 and 2.
Figure 1. E-portfolio exemplar, grade 10 student
Iterations 1 and 2: Wiki Technology

For both iterations of the study, students used a wiki technology tool as their individual and collaborative reflective spaces. Stemming from the e-portfolio tool used in the pilot phase, the wiki tool was developed with a more purposeful collaborative and reflective design. The pedagogical factors leading to the wiki designs and redesigns over iterations one and two are further addressed in the next chapter as part of the study results and discussion. This section also serves to outline the overall structure of the wiki technology used in the study.
The wiki design used in both iterations encompassed two areas: (1) an individual area for students’ written goals and musical artifacts, which were not shared with all members of the class, but could be seen and evaluated by the teacher and could be further developed by the students as well as selectively “opened” for public sharing if the student wished to do so, and (2) public areas including individual student pages and a collaborative discussion area that was accessible to all students in the class. The wiki design allowed for images, audio, and video files to be incorporated in both the individual and collaborative sections; that was an important design factor as prior research had shown this media inclusion to be beneficial to learners in the music context (Berg & Lind, 2003). The immediate aural feedback through audio and video recordings of both ensemble and solo singing allowed for students to hear their own voices and further develop their critical reflective skills.

The wiki design initially focused on three forms of intervention in student development of reflective and collaborative learning skills: immediate feedback through design features of the technology-enhanced learning environments, self-assessment of feedback, and peer-exchange within a community of learners. In designing the wiki, it was important to keep a section accessible only by the individual student and teacher to ensure that students had a place to create and reflect freely that was not necessarily shared with their peers in the collective community. The individual section of the vocal wiki also included certain key reflective elements, such as the student vocal biography, self-evaluation, goals, and periodic personal musical reflections.

It was also important to create discussion areas where the entire vocal class community could listen to ensemble recordings and collaboratively and critically reflect on what they heard. The social and collaborative dimensions of the wiki, both for peer review of ensemble work and for creating shared musical ideas, was a key feature of the design. Certain aspects of the wiki
structures differed between the Upper and Senior vocal classes as they were designed to fit within the context of the course (i.e., to assure that activities were age appropriate in their pedagogical structure and academic expectations). For example, the students of the grade 10 vocal music class expressed discomfort and anxiety at the prospect of sharing musical compositions in an online forum and so this element was not integrated into the Upper vocal class wiki design, but it was part of the Senior vocal class wiki.

**Procedure**

Each of the secondary music classes was oriented toward the wiki process as part of initial discussions about course process and course assessment. The students and I discussed the rubrics together for the assessment of vocal wiki contributions in order to ensure that the students were very aware of how they were being assessed as well as familiarized with the role of the wiki within the overall course design. Vocal students were actively involved in several aspects of their own wiki page design (within the limits of the design) and the exact inclusions in the wiki in terms of media were relatively fluid and changed slightly as the course unfolded to allow for individual students’ musical goals to be set and put into process and, ideally, achieved in some capacity. This involvement of the students in the design process aligns with the design-based research methodological view that participants are not “subjects” but instead take on the role of co-participants both in design aspects and analysis (Barab & Squire, 2004).

**Data Collection**

**Data Sources**

Design-based research is said to be integrative, in that design-based studies often use a combination of methods and data from multiple sources in order to increase objectivity, validity,
and applicability of the ongoing research (Wang & Hannafin, 2005). This study, as well, used a variety of data collection methods in order to investigate the research questions. Data sources included the researcher/teacher research journal outlining the curriculum interventions and learning journey throughout the process, student feedback through email and focus group interviews, and all wiki data, which represented the major portion of the study data. The wiki data included: (1) all peer interaction on the wiki collaborative pages, such as ensemble repertoire discussion, (2) all individual student reflections on the individual project pages including biography, goals, various artifacts such as photographs and recordings, as well as written reflections. For the purpose of this study, no contribution to the wiki that occurred outside of the two iteration cycles was included as part of the data collection and analysis.

**Teacher/Researcher Journal**

As the teacher/researcher, I kept a research journal, making contributions at least once per week documenting my observations of the vocal classes in their interactions and music-making as well as reflections about my role as the teacher during each iteration. I was particularly interested in noting examples of collaboration, student artistic decision-making, references to self-regulated and reflective learning processes, and struggles or successes as related to the wiki interaction. The journal contained 13 reflections during the pilot, 19 reflections during iteration 1, and 24 reflections during iteration 2. These reflections were examined during the enactment analysis and informed both the analysis of the role of the teacher as well as the design recommendations for the following iteration.
Focus Group Interviews

To obtain a deeper understanding of the student experience during each study iteration, I conducted focus group interviews involving any students who wished to participate from each of the Upper and Senior vocal music classes. Focus group interviews were guided, using a common set of 15 questions for each class (Table 1), but also allowed for students to deviate from the questions to add comments regarding their personal experiences during each iteration. Focus group questions centered around SRL processes (Zimmerman, 2000) and technology scaffolds within the wiki design.

Table 1

Focus Group Questions

<table>
<thead>
<tr>
<th>1)</th>
<th>Did you find it helpful to make and then listen to recordings, both ensemble and solo? Did you like this process? Did you not enjoy it? Why?</th>
</tr>
</thead>
<tbody>
<tr>
<td>2)</td>
<td>Do you think that it helps you as a singer and as a musician to listen to yourself through recordings?</td>
</tr>
<tr>
<td>3)</td>
<td>Regarding the wiki collaborative sections, do you think that you received useful feedback from your peers?</td>
</tr>
<tr>
<td>4)</td>
<td>Did your reflections on the recordings (both collective and your individual analysis) help you come to new thoughts about the music?</td>
</tr>
<tr>
<td>5)</td>
<td>Did making and listening to the recordings and the reflective process make you more motivated or aware of your personal musical goals?</td>
</tr>
<tr>
<td>6)</td>
<td>How did the use of the vocal wiki (recordings and collaborative feedback) differ from our usual vocal assessments, such as vocal checkpoints, that occur in our vocal class?</td>
</tr>
<tr>
<td>7)</td>
<td>What strategies did you use to achieve your musical goals? Did you go back and revise your goals throughout the term?</td>
</tr>
<tr>
<td>8)</td>
<td>Did you have any technical difficulties with making the recordings or with the wiki overall?</td>
</tr>
<tr>
<td>9)</td>
<td>Did you find the wiki confusing to navigate? If so, why?</td>
</tr>
<tr>
<td>10)</td>
<td>Did you appreciate having the private page for your individual goals and reflections?</td>
</tr>
<tr>
<td>11)</td>
<td>Do you think that this process, the recordings and listening, has helped to build your musical skills?</td>
</tr>
<tr>
<td>12)</td>
<td>Did you have any anxiety around the wiki or the recording process?</td>
</tr>
<tr>
<td>13)</td>
<td>Did the ensemble recordings help you as a singer in the vocal ensemble?</td>
</tr>
<tr>
<td>14)</td>
<td>Did any of this process (recordings, wiki, reflection) make you think about other areas of the arts?</td>
</tr>
<tr>
<td>15)</td>
<td>Is there any other feedback that you wish to share with me regarding any aspect of the vocal class wiki?</td>
</tr>
</tbody>
</table>
Focus group interviews occurred after both iteration one and iteration two of the data runs, after all marks were collected and inputted for each class. Students were aware that participation in focus group interviews was voluntary and would not affect their final marks in any way. The focus group sessions were held in a neutral, non-threatening environment, so that the study group student participants felt that they could contribute to the discussion honestly and safely. The purpose of the focus group interviews was to allow for student discussion and verbal reflection on the technology integration as it related to their experience in the vocal music class. The focus group interviews served as a valuable place for student discussion regarding design improvements of the wiki tool as well as reflection on learning benefits of the wiki tool. Focus group interviews were transcribed verbatim and this qualitative data was used to support the case studies, which are outlined in Chapter 5. The focus group discussions were also examined for emerging themes that linked to the content codes schemas used in content analysis of the wiki data.

**Case Studies**

With a goal of providing a deeper look into the individual student experiences with the wiki, three case studies were prepared involving three different student participants. Students were selected to represent a range of grades and vocal levels as well as number of years in the vocal music program. Each case study begins with a detailed description of the student including their musical background and experience, general personality description, and overall study participation. Following this, the case study outlines each student’s development through three main areas: musical identity, collaborative learning, and metacognitive engagement. The case studies conclude with a discussion of the overall development of reflective musical growth including general interpretations from the case studies. In preparing these cases, there was a
deliberate attempt to reflect the student voices through the use of extensive quotations from the students. It was important that the reflections, perspectives, and experiences of the students emerged through rich and detailed quotes giving value to their beliefs and thoughts.

**Data Analysis**

The extensive content of the wikis from both design iterations provided the most important and comprehensive data source for this research. Coded analysis was the first phase of data analysis for all vocal wiki data from both iterations. A rubric tool was created to analyze the three dimensions of performance, collaboration, and reflection that had emerged from the pilot phase. This rubric was used to analyze the vocal wiki content of all students in each of the study iterations. Each student’s wiki contribution was scored in the three dimension areas according to the levels and aspects outlined on the rubric tool (Table 2). The rubric was created using assessment tools currently used in the study school’s music curriculum documents based on Ontario curriculum documents. Each student dimension was scored on a scale of 1 to 4, with 1 being the lowest level of each dimension and 4 being the highest. The performance scores were developed using the final performance marks of each student, which was considered an appropriate measure of performance skill. The collaborative code rankings were formed by an examination of both the frequency and the quality of the comments in the collaborative discussion sections of the vocal wiki. Similarly, Table 2 shows that the reflective code rankings took into consideration both the quantity of reflection entries in the vocal wiki as well as the depth of the reflective analysis as per the rubric tool.
**Table 2**

*Coded Analysis Tool: Scoring Rubric*

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COLLABORATION</strong></td>
<td>Effectively builds on the comments of others as well as offers new perspectives (both positive and constructive) on music-making of self and peers, adding to the collective improvement, growth and knowledge of the class.</td>
<td>Often tries to build on the comments of others as well as offers new perspectives on music-making of self and peers, frequently adding to the collective improvement, growth and knowledge of the class.</td>
<td>Attempts to offer feedback on the collective portions of the wiki but does not read or build on the comments of others, offers only positive feedback at all times, nothing constructive.</td>
<td>Does not effectively participate in the collaborative portion of the wiki through effective comments or questions.</td>
</tr>
<tr>
<td><strong>REFLECTION</strong></td>
<td>Demonstrates open, non-defensive ability to self-appraise, discussing both growth and frustrations as they relate to musical learning and self-growth as a musician. Risks asking probing questions or reflective comments about self and seeks to answer these. Ability to articulate artistic goals.</td>
<td>Overall very open but at times, one-sided (overly positive or critical) in analysis of self-growth and musical learning. Asks some probing questions or reflective comments about self, but does not always engage in seeking to answer these. Developing ability to articulate artistic goals.</td>
<td>Sometimes defensive or one-sided in analysis of self-growth and musical learning. Asks some probing questions about self, but does not engage in seeking to answer these. Very basic ability to articulate artistic goals.</td>
<td>Little self-disclosure, minimal risk in connecting concepts from class to personal musical experiences. Self-disclosure tends to be superficial and factual, without self-reflection. Difficulty articulating artistic goals.</td>
</tr>
<tr>
<td><strong>PERFORMANCE</strong></td>
<td>Strong technical skills developing. Facility in different registers of voice, facility with different articulations. Strong musicality evident in interpretation through expression and stylistic elements.</td>
<td>Technical skills are developing well. Facility in most registers of voice, facility with some different articulations. Dynamics and phrasing are used to express text.</td>
<td>Some facility in different registers of the voice, limited facility with articulations. Some attempt at phrasing and dynamic contrast.</td>
<td>Difficulty moving registers in voice, little ability to demonstrate different articulations. Lack of phrasing, dynamics and overall musical interpretation.</td>
</tr>
</tbody>
</table>

The second phase of the data analysis was the content coding of all wiki data in both study iterations. This involved the development of coding schemes from an open coding
framework, where I established the content analysis codes both in conjunction with the research questions and any additional themes that had emerged from the data during the first analysis phase. This method is consistent with a grounded theory approach (Creswell, 2007; Strauss & Corbin, 1997). The individual reflection sections of the vocal wikis for all students in both iterations were first coded using the 10 content analysis codes (Table 3).

Table 3

Content Analysis Categories: Individual Reflections

<table>
<thead>
<tr>
<th>Content Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA: Self-awareness</td>
<td>Self-awareness of musical development, setting learning and process goals</td>
</tr>
<tr>
<td>SD: Self-Doubt</td>
<td>Expressions of doubt, fear, anxiety that can involve any aspect of singing, performing, recording self, listening to ensemble recordings, technical anxiety or issues</td>
</tr>
<tr>
<td>ID: Identity development</td>
<td>References to identity as a singer, musician and personal identity connections</td>
</tr>
<tr>
<td>MP: Musical processes</td>
<td>Composing, practicing, improvising, performing – all aspects of active music-making</td>
</tr>
<tr>
<td>VE: Vocal ensemble development</td>
<td>All references to collective, vocal ensemble work</td>
</tr>
<tr>
<td>SV: Solo vocal development</td>
<td>References to singing as a soloist, solo vocal technique and development</td>
</tr>
<tr>
<td>IMM: Informal music-making</td>
<td>References to improvisations, performances, musical events, self-taught or exploratory musical skills occurring outside of the vocal classroom</td>
</tr>
<tr>
<td>S: Successes</td>
<td>References to positive performances, goal completion, personal musical satisfaction</td>
</tr>
<tr>
<td>MC: Metacognitive engagement</td>
<td>Wiki process, recording and reflective processes connected to student understanding and development, goal monitoring, self-evaluating</td>
</tr>
<tr>
<td>SCI: Social and Collaborative interactions</td>
<td>References to collaborative dialogue, ways that the students refer to interacting musically or socially</td>
</tr>
</tbody>
</table>
For the content analysis of the collaborative discussion areas of the vocal wikis for all students in both iterations, the same 10 content coding codes were used along with five new content codes that were specific to collaborative online environments (Table 4).

Table 4

*Content Analysis Categories: Collaborative Discussion Pages*

<table>
<thead>
<tr>
<th>Content Code</th>
<th>Brief Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA: Self-awareness</td>
<td>Self-awareness of musical development, setting learning and process goals</td>
</tr>
<tr>
<td>SD: Self-Doubt</td>
<td>Expressions of doubt, fear, anxiety that can involve any aspect of singing, performing, recording self, listening to ensemble recordings, technical anxiety or issues</td>
</tr>
<tr>
<td>ID: Identity development</td>
<td>References to identity as a singer, musician and personal identity connections</td>
</tr>
<tr>
<td>MP: Musical processes</td>
<td>Composing, practicing, improvising, performing – all aspects of active music-making</td>
</tr>
<tr>
<td>VE: Vocal ensemble development</td>
<td>All references to collective, vocal ensemble work</td>
</tr>
<tr>
<td>SV: Solo vocal development</td>
<td>References to singing as a soloist, solo vocal technique and development</td>
</tr>
<tr>
<td>IMM: Informal music-making</td>
<td>References to improvisations, performances, musical events, self-taught or exploratory musical skills occurring outside of the vocal classroom</td>
</tr>
<tr>
<td>S: Successes</td>
<td>References to positive performances, goal completion, personal musical satisfaction</td>
</tr>
<tr>
<td>MC: Metacognitive engagement</td>
<td>Wiki process, recording and reflective processes connected to student understanding and development, goal monitoring, self-evaluating</td>
</tr>
<tr>
<td>SCI: Social and Collaborative interactions</td>
<td>References to collaborative dialogue, ways that the students refer to interacting musically and socially</td>
</tr>
<tr>
<td>P: Positive feedback</td>
<td>Positive compliment or comment about the recording or performance</td>
</tr>
<tr>
<td>N: Negative feedback</td>
<td>Negative comment with no constructive element about recording or performance</td>
</tr>
<tr>
<td>C: Constructive feedback</td>
<td>Expression of a positive or negative comment with a constructive addition or next step outlining how to improve or grow further</td>
</tr>
<tr>
<td>D: Discussion/Interaction</td>
<td>Building on someone else’s comment or referring to someone else’s comment in a post</td>
</tr>
<tr>
<td>SC: Use of social cues</td>
<td>Includes: self-introduction, expression of feeling (e.g., &quot;I'm feeling great&quot;), greeting (e.g., &quot;Hi, everyone&quot;), closure (e.g., &quot;That's it for now&quot;), jokes, the use of emoticons (e.g., :) or :)), and compliments to others</td>
</tr>
</tbody>
</table>
Following the initial data analysis, I employed axial coding to connect three of the more recurring initial themes for a second analysis and scoring (Creswell, 2007). These three codes were the self-awareness (SA), identity development (ID) and metacognitive engagement (MC) codes. The resulting combined code was labeled self-reflection and scored as per the rubric in Table 5, based on Zimmerman’s notion of self-reflection in the SRL process (2000). This procedure resulted in more focused findings about learning outcomes associated with the wiki implementation.

Table 5

*Self-Reflection Rubric*

<table>
<thead>
<tr>
<th>Process score</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self-reflection:</strong> self-judgement and self-reaction</td>
<td>Demonstrates self-reflective processes with a high degree of effectiveness</td>
<td>Demonstrates self-reflective processes with considerable effectiveness</td>
<td>Demonstrates self-reflective processes with some effectiveness</td>
<td>Demonstrates self-reflective processes with limited effectiveness</td>
</tr>
</tbody>
</table>

Because the design-based research process was cyclical in nature, the steps of design, implementation, analysis and redesign for this study occurred during two different academic years. During each data collection and analysis cycle, results of analysis were connected to the design features and changes to the vocal wiki tool as well as to pedagogical changes in the learning environment that might have occurred due to this implementation.
All of the data analysis results were examined through the running of $t$-tests to compare the different iterations and different student groups, including the repeated exposure group, for significant results. These graphs and $t$-test findings are presented in Chapter 4.

**Dimensions of Analysis**

Each of the iterations of the wiki design was analyzed and evaluated according to three overall dimensions. These areas represent different aspects of the design and enactment of the wiki tool. The three dimensions include:

1. **Collaboration:** An examination of collaborative aspects of the wiki, with a focus on the discussion areas, provided evidence of the level of interaction among the students, and demonstration of whether collaborative discussion among the students led to any changes in performance practices.

2. **Reflection:** All aspects of the wiki that included reflective tasks throughout the implement cycles, such as individual written reflections, were examined to provide an indication of the students’ level of reflection leading to critical and metacognitive thinking (Kember et al., 2000) and self-regulated learning processes (Zimmerman, 2000).

3. **Performance:** The performance dimension was deeply embedded into all aspects of the vocal course due to both the focus of the school curriculum guide and the school administration. This dimension overlaps with the other dimensions, particularly the collaboration dimension, since the students are constantly rehearsing, performing, and striving to further develop their vocal performance skills. As indicated in the first chapter, my use of the word “performance” includes musical process aspects such as practicing, improvising, developing technical skills, and sharing creative musical work with others.
The role of the teacher was another area of analysis that examined the enactment of the wiki design process from the teacher perspective. Content for this dimension emerged from analysis of the teacher/researcher journal, which detailed my experiences throughout the design cycles. In addition to these three dimensions, both iteration cycles of the wiki tool are discussed more generally in terms of design features, enactment description, impact of iteration cycles, and design recommendations for further iterations.

**Validation of Data Sources**

Validation of results was met through methodological triangulation and peer debriefing. Although the vocal class wiki content made up the major portion of study data, in order to ensure methodological triangulation, several other data types were also collected and analyzed including the teacher/researcher journal and focus group interviews. After initial data analysis was completed, I shared preliminary interpretations with a peer to determine whether they found my analysis credible and to make changes in analysis accordingly. To establish reliability for the coding rubrics and coding schemes used in data analysis, an additional rater scored a randomized 10% of the vocal wiki data. The second rater holds a Masters Degree in Music and is a longtime music educator having taught at the secondary school and university levels in both Canada and the USA. The second rater scored 10% of the individual reflective data using both the coding rubric and three codes: self-awareness, self-doubt, and informal music-making. Following this, the second rater scored 10% of the collective wiki data using three different content codes: positive feedback, constructive comments, and use of social cues. After the initial rating, the second rater and I were at an 83% agreement with content coding. We discussed the discrepancies in the 17% of different coding results and came to agreement on 98% of these
differences. Overall, these results suggest that the scoring of the vocal wiki data according to the rubric codes and the content coding is reliable.

**Limitations of the Study**

This study examines the vocal wiki implementation as related to self-regulated learning and creating a community of student musicians in secondary music classrooms. Since the study was conducted in a unique independent secondary school setting, the findings are likely not applicable to a larger population of students. This study investigated a design that was idiosyncratic to the specific instructional setting, students, and school curriculum; therefore, translating the findings to a larger student population may be difficult. As indicated in the introductory chapter, the results of the study are not meant to be generalized to a larger population, but rather to provide examples of student learning that may lead to common understanding and serve to better inform curriculum design and offer technology-enhanced pedagogical approaches in music education.

The next chapter outlines study findings of the design and enactment of the vocal wiki tool through two iterations. Each design-cycle analysis focuses on design features and enactment, impact analysis, and recommendations for future developments to the vocal wiki tool.
CHAPTER 4: Findings and Discussion

Chapter Overview

This chapter presents study findings of the design and enactment of the wiki tool through two design cycles. The chapter is divided into two major sections, each presenting findings from one design cycle. I begin by describing the design features that came out of the pilot phase, informing the first iteration as it moved from the e-portfolio tool to the “vocal wiki” tool. I then analyze each iteration in terms of design features and enactment, focusing on three dimensions: collaboration, reflection, and performance. Each iteration section begins with a short discussion of the integration of the wiki into the overall course design, and also includes a description of the role of the teacher throughout the respective design iteration. Finally, an impact analysis, focusing on observations of student learning, and recommendations for future developments to the wiki tool are outlined at the conclusion of each design-cycle analysis.

Design Recommendations for Iteration One: Lessons Learned from Pilot Study

After the pilot phase of this study was completed and examined, the decision was made to move from the e-portfolio to the wiki tool.

For the first iteration of this study, a wiki-based technology was designed in order to support a more collaborative aspect of student community than the pilot e-portfolio had allowed. The e-portfolio involved only collaboration and interaction between the individual student and the teacher/researcher, with no opportunities for collaboration with peers. It was decided that a wiki could make collaboration more explicit, supporting a more structured design while retaining the pedagogically valuable elements of the e-portfolio. The additional features supported by the wiki tool, as compared with the e-portfolio are outlined in Table 6. Students in iterations one
and two used a vocal wiki tool with both individual and collaborative spaces to reflect and analyze their music-making. The wiki provided the best technology functionality for this purpose because it allowed students to easily access class recordings and build on each other’s critical comments in discussion areas. Additionally, the wiki technology allowed for a quick start-up time, as the students did not require any lengthy training on the use of this technology.

The other pedagogical element that was changed between the pilot e-portfolio and the iteration one vocal wiki was the addition of student recordings to the wiki, with the goal of developing both individual and collaborative reflections on student vocal performance progress. The addition of the student ensemble recordings was important to helping students develop analysis skills, leading to reflection on musical goals and, ultimately, developing aspects of student self-directed learning. Through the addition of the recordings, students were encouraged to reflect on vocal works in progress, such as a song where the ensemble was struggling with a particular technical element such as intonation. The vocal wiki was intended to support reflection on areas of development as singers and works-in-progress to lead to more agency and self-direction throughout musical processes that occurred in the classroom.

Table 6

*Comparison of Design Features: Pilot to Iteration One Content*

<table>
<thead>
<tr>
<th>DIMENSION:</th>
<th>Pilot: E-portfolio</th>
<th>Iteration One: Wiki</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaboration</td>
<td>..................................................</td>
<td>Collaborative discussion area</td>
</tr>
<tr>
<td>Collaboration</td>
<td>..................................................</td>
<td>Public pages</td>
</tr>
<tr>
<td>Reflection</td>
<td>Vocal biography</td>
<td>Vocal biography</td>
</tr>
<tr>
<td>Reflection</td>
<td>Self-evaluation with goals</td>
<td>Self-evaluation with goals</td>
</tr>
<tr>
<td>Reflection</td>
<td>Artifacts and individual reflections</td>
<td>Artifacts and individual reflections</td>
</tr>
<tr>
<td>Performance</td>
<td>..................................................</td>
<td>Ensemble recordings</td>
</tr>
</tbody>
</table>
Iteration One: Design Analysis

Iteration one of this study was again conducted within the music curriculum in the Upper (grade 10) and Senior (grades 11 and 12) that involved development of vocal technique, application of the musical elements to performance, and development of overall student musicianship. Many of the performance elements of the vocal music course needed to be developed through individual practice or reflection while other skills could be strengthened through collaborative practice, improvisation, listening, or reflection. Thus, these elements were all deliberately incorporated into the vocal wiki design.

Integration of the Wiki into Overall Course Design

My goal in this wiki iteration was to support and enhance the existing performance-based music program of the school while fostering self-directed learning in music students. I designed the vocal wiki so that individual activities, such as listening to ensemble recordings and responding through written posts and reflections, could be completed outside of class time. Students were expected to practice their singing and vocal skills as part of their music course homework and the wiki was intended to contribute to and enhance this practice routine that students had in place. I introduced the wiki tool at the beginning of the third term of the school year when we shifted from e-portfolios to the vocal wiki in the Upper and Senior music classes. I let students know that we were moving to this new format, the vocal wiki, to allow for collaboration, increased reflection and to further enhance our performance studies through the inclusion of recordings. The students seemed quite excited by these ideas and very much bought into the wiki as part of their regular coursework. By March, it was late enough in the school year that the students and I had developed a good rapport, they had worked with e-portfolios already
for six months and they were comfortable with technology tools; all of these were contributing factors in the successful integration of the vocal wiki into the music courses.

Other than a few technical difficulties, such as clarifications needed in terms of layout of the wiki, there were few problems in terms of students choosing not to engage with the vocal wiki. The students were aware that they were being graded on the wiki, just as they had been on the e-portfolio assignment, in terms of participation in the wiki and completion of required elements as well as the level of reflection and analysis. Figure 3 illustrates the home page of the Upper vocal wiki during the first iteration.

Figure 3. Upper vocal class wiki, iteration one
Collaboration

The main collaborative element of the wiki design was the collaborative ensemble repertoire pages. These pages were designed to facilitate collaborative discussion and critical peer analysis among the members of the vocal classes. The goal of this discussion and peer feedback was to move the focus away from the teacher/conductor as the central, and often only, critic and evaluator of student singing. Each collaborative page on the vocal wiki included the posting of a class ensemble recording, followed by an area where students could post reflection and feedback after listening to the recording of their performance work-in-progress.

The design intention of these collaborative pages was that students could listen to the recorded ensemble repertoire performances and add comments about what they heard in these recordings. The learning goals of this collaborative design were twofold: Firstly, that the students were developing musical self-analysis skills as they listened to their own voices within an ensemble and, secondly, that they further developed their reflective learning through reading the comments of their peers by building on the comments of others and through writing their own critical comments (Johnson & Johnson, 2009; Webb, 1989; Webb & Mastergeorge, 2006).

To further support collaboration, the wiki design included a public page for each student where they could post their vocal biography, which was a reflective element taken from the pilot e-portfolio design that had previously only been seen by the student and teacher. Thus, the vocal biographies were now made public and shared with other students in the class, as shown in Figure 4. The aim of this shared space was to create an increased sense of community within the vocal classroom by allowing the students to share their musical biographies with their peers.
As previously noted, one of the main design features of the vocal wiki was the creation of collaborative spaces to foster community building and student interaction. This was a pedagogical area that was absent in the e-portfolio design and, therefore, the addition of the ensemble repertoire pages to the wiki for both classes fulfilled the desired collaborative component. It was on these ensemble performance pages that students listened to class recordings that were often works-in-progress, rather than polished performances, and posted critical comments, both positive and negative, with the goal of improving as an ensemble. The addition of this collaborative space was one of the most important design aspects of the vocal
wiki in terms of fostering community. Figure 5 is an exemplar of a collaborative ensemble page from the first iteration Senior class vocal wiki.

Figure 5. Collaborative discussion page, iteration 1

**Reflection**

To encourage deeper personal reflection, the wiki design included a safe space for each student to add personal reflections where only the individual student and teacher could access and view the reflections. As was the case with the pilot e-portfolio, each student had a private page where individual reflections were posted, allowing opportunity for written reflections in a more private, journal-like setting, in contrast with the public pages and the discussion pages.
The reflective elements that were built into the private page design were the self-evaluation with vocal goals and the student-selected artifacts with written reflections. Along with the vocal biography, which was posted in the individual public pages, the self-evaluation was a key design feature in fostering reflective thinking as well as self-directed learning skills such as goal setting. The vocal biography design feature was included from the pilot e-portfolio phase with the intent to encourage reflection in the area of musical identity and ownership. Figure 6 is an exemplar of a private page from the first iteration Senior class vocal wiki.

Figure 6. Individual private page, iteration 1
The emphasis on reflection was an aspect of the e-portfolio design that had worked well in the pilot phase and it was important that these reflective features be incorporated into the vocal wiki design.

**Performance**

The inclusion of audio recordings was an important addition in the wiki design from the e-portfolio that allowed for further development of performance skills. These ensemble repertoire recordings, in the form of MP3 files, provided a new dimension of performance analysis because music students were now able to both listen to themselves and their peers sing as well as reflect on their progress, both individually and collaboratively, with the goal of improving as a vocal ensemble. The vocal class recordings were designed to be part of the collaborative ensemble pages, providing the vocal ensemble exemplars that students could listen to and discuss through posted comments. The design of this dual process of first listening to their own singing and then reflecting with their peers was intended to foster both the development of musical skills, such as aural and vocal technique skills, as well as the development of self-reflective skills leading to further agency and ownership of ensemble musicianship.

In terms of musical content, the vocal repertoire that was used in the ensemble progress page recordings was a mix of popular music, musical theatre, and one operatic piece. Vocal repertoire for the Senior vocal class was selected by both students and the teacher. All ensemble pieces were being prepared for various spring performances for the school community. Vocal ensemble repertoire for the Senior vocal class for the first iteration included: “Angel” by Canadian singer/songwriter Sarah McLachlan, “For Good” from the musical *Wicked* by Stephen
Schwartz, and “O Mio Babbino Caro” from Giacomo Puccini’s opera *Gianni Schicchi*, sung in Italian.

The musical content for the Upper vocal class ensemble progress pages for the first iteration consisted of two popular songs that were jointly selected by the students and teacher. These songs were: “Only Hope” written by Jon Foreman and made popular by performer Mandy Moore and “Lean On Me” written by American singer/songwriter Bill Withers and recently made popular again through performance on the hit television show *Glee*.

**Iteration One: Enactment Analysis**

In this section, I describe the students’ participation in the vocal class wiki activities as a means of analyzing the enactment of the wiki tool. Although the overall design goals and wiki technology tool were the same, there were differences in the way that the Upper and Senior vocal classes engaged with the wiki. These differences in enactment can be primarily explained in terms of differences in the curriculum content and course goals in each of the two vocal classes; however, they were also influenced to some degree by differences in the composition of the classes. Each group of students brought with them uniqueness in terms of their ages, musical background and vocal experience, their comfort level with use of technology, as well as their previous experiences or lack of experiences with critical self-analysis and reflection in music education. The individual student experiences of engaging with the vocal wiki are further explored in the chapter 5 case studies.

For the first design iteration, the vocal wiki for both the Upper and Senior classes consisted of individual student public pages with vocal biographies, two ensemble recording pages with collaborative comments, and individual student reflective pages that were private. During this design cycle, there were assigned individual reflections per class with two required
reflections for the Upper class and four required reflections for the Senior class. Several students in both classes chose to go beyond these minimum expectations by posting additional reflections. Students were not given extra marks on quantity of wiki work, with the exception of the required content as outlined above; therefore, any additional wiki work was at the discretion of the student and was, presumably, not motivated by higher marks.

**Collaboration**

A quantitative summary of the vocal class wiki posts in the collaborative sections can be found in Table 7 and demonstrates a high participation result from the students. Of the two students who did not actively participate, one student had frequent technical difficulties and eventually sent comments by email in order to still participate in this section of the wiki and the other student was on medical leave during the collaborative portions of the wiki and thus not expected to complete this portion of the wiki.

Table 7

*Collaborative Wiki Quantitative Engagement, Iteration One*

<table>
<thead>
<tr>
<th></th>
<th>Total Number of Students</th>
<th>Number of Students who participated</th>
<th>Number of Posts</th>
<th>Total Word Count of all Collaborative Posts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Vocal (Grade 10)</td>
<td>9</td>
<td>9</td>
<td>20</td>
<td>1029</td>
</tr>
<tr>
<td>Senior Vocal (Grades 11/12)</td>
<td>22</td>
<td>20</td>
<td>81</td>
<td>1088</td>
</tr>
</tbody>
</table>

The coded analysis of the collaborative dimension shows a positive collaborative learning attempt during the first iteration. This is encouraging in terms of design evaluation because all of the iteration one students are coming from the more individual focus context of the pilot e-portfolios.
In spite of the high participation results in the ensemble repertoire pages previously outlined in the enactment analysis, the collaborative quality of the ensemble repertoire pages was not as high as anticipated. Not as many students as anticipated built on comments of their peers in these discussion areas. Some students simply fulfilled their comment requirement by repeating what others had already written, while other students wrote excellent constructive comments, but did not build on previous comments of their peers in any way. There were good examples of effective analysis from students after their active listening of the ensemble recordings, which had been a design goal; however, these constructive comments appeared to be written in an individual manner, as opposed to an in-discussion style with peers. There was very little demonstration of connectivity to the comments of the whole group. This was not entirely surprising for an early attempt at collaborative learning in an online format, but it certainly was an aspect of the design that could be improved for the second iteration cycle.

The content of all collaborative pages was coded using the scheme presented in the third Chapter. The Senior vocal students were quite critical of the ensemble performance recordings during the first iteration, somewhat to my surprise (I did not expect that they would be willing to post critical comments online in a collaborative space); however, it was rare to have a negative post without a constructive comment as part of the post. This only occurred once, when a student was referring to himself in the collective pages. The Senior vocal students were quite used to performing and perhaps transferred that comfort into the online space, allowing for critical reflection about their ensemble performance. Overall, as reflected in the content coding, there were few examples of actual discussion or building on the comments of others. While the students were engaging with the wiki by listening to the MP3 recordings and posting critical comments, there was not as much actual dialogue as had been intended by the design.
In contrast, the Upper vocal wiki collaborative sections from the first iteration involved much more discussion than the Senior vocal wiki. A few general observations were that this group wrote longer comments than any of the other groups in terms of word length, that they were more positive in their posts in terms of language use, but also always had excellent constructive elements within these posts. This group also had the highest level of social expression, in terms of feelings, jokes, specific compliments to each other, and frequent use of symbolic icons to express emotion. An important observation of the Upper class vocal wiki use is that there was much more collaborative discussion happening here in terms of both reading and building on the comments of others. This was perhaps the best example of dialogue throughout the wiki implementation, noting that wikis are not intrinsically purposed for dialogue. The reasons for this strong interactivity could be related to the close nature of this class, due to its small class size of nine students, and the dedicated nature of these particular students (something noted in the teacher/researcher journal: that this was a “highly motivated group of student musicians”).

![Figure 7. Coding of collaboration, iteration one](image_url)
An interesting analysis observation is that the Senior students had four times as many posts as the Upper students, but that the Upper students had more of the collaborative codes, including the discussion code, in their posts. The interpretation of this finding was that the Senior vocal students tended to focus more on individual posts, perhaps because they had been more focused on individual e-portfolio and reflective work for a longer period of time than the Upper school students.

Reflection

In addition to the collaborative areas where reflection was occurring in community comments and replies, there were also areas for individual reflection in the vocal wiki design. The decision was deliberately made to retain the private reflection pages from the e-portfolio design, where students posted individual reflections that were not shared with their peers. It was important to maintain this individual reflective space allowing for in-depth, personal reflections. Students used these spaces to discuss more personal aspects of their musical development including expressions of their musical preferences and musical identity as well as perception of their own areas of needed improvement as singers.

Both the Upper and Senior class students participated in the individual reflection portions of the wiki, which is not surprising since these students had all previously done the e-portfolio and this aspect of the wiki was very similar to the e-portfolio structure. In fact, all of the students contributed at the very minimum two reflections to their individual private pages. The Upper vocal class had two required individual reflections to complete and all students completed between two and four individual reflections with the average being three individual reflections per student. The Senior vocal class had four required individual reflections and all students completed a minimum of two and a maximum of eight individual vocal reflections with the
average number being six; so again, students completed, on average, above the requirement. Thus, the enactment of the individual reflective pages was faithful to the design and, in many cases, went beyond the minimum requirement in the wiki design.

All student reflections, which were scored using the rubric presented in Chapter 3, illustrated strong reflections – including through self-assessments – with links to vocal goals for both Upper and Senior vocal classes in the first iteration. The coding of student reflection scores is shown in Figures 8 and 9, with separate graphs showing the average reflection score for Upper (m=2.89) and Senior (m=3.14) students. While a t-test reveals that this difference in total reflection score is not statistically significant, the higher mean score could be explained by the fact that the Senior sample included many students who had been in the pilot phase, where they experienced focused reflective writing through the e-portfolio tool. Thus, the Seniors could have slightly stronger reflective scores due to their greater maturity and greater levels of experience working with e-portfolios for a longer amount of time.

![Reflection Scores Graph](image)

*Figure 8. Graph of upper vocal class reflection scores, iteration one*
Figure 9. Graph of senior vocal class reflection scores, iteration one

Some interesting patterns could be discerned from the coding of the reflective data in both classes. There were links between the appearance of self-awareness codes in reflections describing musical issues or struggles followed by a description of how the student learned from this struggle or how they approached the musical problem. In these cases, there often appeared a path to success that contained the following codes, not always in this order: an utterance of self-doubt (SD), usually followed by either a self-analysis code (SA) or a musical process code (MP), and then, in some cases, a success code (S).

Table 8

<table>
<thead>
<tr>
<th>Code</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD</td>
<td>In past years, I have been reluctant to use my falsetto range in choirs and performances. I do not feel that it is very strong and when I use it, I sometimes feel as though I am losing control of my voice.</td>
</tr>
<tr>
<td>MP</td>
<td>In order to fix these problems, I will practice singing in my falsetto on a more regular basis, and will not be reluctant to sing pieces that require me to use my falsetto.</td>
</tr>
<tr>
<td>SA</td>
<td>I believe that if I simply practice singing in my falsetto more often, it will continue to develop, and I will be able to grasp greater control of it.</td>
</tr>
</tbody>
</table>
Another interesting pattern is that the self-doubt (SD) code was usually connected to a reflection about one’s own voice (noted through the solo vocal “SV” code), not about the entire group or ensemble. Expressions of self-doubt also came up in focus group discussions in conjunction with the theme of striving for musical perfection and anxiety around the process of recording. This is expressed in a focus group comment from a Senior student who was working on a solo recording for an upcoming performance and chose to post it on her private page:

_When I did my recording and then listened, I really hate, I know that I’ve said this before, but I hate listening to myself. And so I am really critical, do I want to try recording again or just post this? Is it good enough?_

- Amy, Focus group interview, June 2012

The idea of self-doubt and questioning as a motivating factor for independent music learning is further explored in the following chapter through the case studies.

**Performance**

As previously mentioned, performance is the aspect of student musical development most emphasized at the school setting for this study and was, therefore, woven deeply into the vocal wiki design. Because of this program emphasis, it is not surprising that the vocal students were active in the performance portions of the vocal wiki. All of the vocal students in the Upper and Senior classes chose to take the course as an elective and were, therefore, generally quite engaged in the performance portion of the class. The ensemble repertoire recordings were taken in class on my computer and later posted on the collaborative ensemble pages where listening and collaborative discussion followed.

Additionally, as noted in the teacher/researcher journal, every single student in both Senior and Upper vocal classes made reference to an aspect of performance in their self-evaluation goals. This was not surprising due to the performance focus of the music program at
the study school, but it did emphasize the importance of performance for the students as well.

The aspects of vocal performance mentioned in the goals was extensive and included vocal technique development such as range development, vocal projection and air support, improved sight singing, effectively performing different vocal styles, and effectively interpreting and expressing music in performance. Overall the most frequently mentioned performance-related goal had to do with confidence in performing. Here are two excerpts from self-evaluations that refer to this aspect of performance:

*Although I have participated in many public performances over the past few years, I often find myself holding my voice back slightly when I perform in public. This is because I am constantly worried about making mistakes, and embarrassing myself in front of the audience. In order to increase my confidence performing in public, I am going to begin memorizing my music more efficiently, which will help to remove the anxiety of potentially forgetting a lyric. I will also dedicate a greater amount of time to practicing my technique, and apply it to my performances, thereby increasing my confidence.*  
  - Alexa, Grade 11 student, Iteration 1 Self-Evaluation Excerpt

*I am very ok with singing in public however I just do the bare minimum and I don’t put all that I have into the performance, if I could just increase my confidence that I will not make a mistake then I could try new things when I perform and I would not have to just sing the piece as it was written but I would put my own spin onto it.*  
  - George, Grade 10 student, Iteration 1 Self-Evaluation Excerpt

This theme of increased confidence when performing connects to several of the content analysis codes including self-doubt, musical processes, and self-awareness. These ideas have all been further explored in the case studies in the following chapter.

The scoring of iteration one shows that the performance ratings per student in both vocal classes are relatively strong. Student performance scores are summarized in Figures 10 and 11, with separate graphs showing the average reflection score for Upper \((m=3.44)\) and Senior \((m=3.64)\) students. These scores are not significant.
These high performance scores are not surprising, due to the performance focus of the music program at this school. Additionally, students in the grade 10, 11 and 12 vocal classes have all chosen to take vocal as an elective. Because of this element of choice, it can be assumed that
these are fairly motivated and experienced vocal students since all of the students in grade 10 and above must have the pre-requisite grade 9 vocal credit or permission of the instructor to join the course. There are very few students who enter the Upper or Senior vocal classes with no musical or performance experience due to the structure and curriculum guidelines of the school.

An important design aspect that was meant to enhance student learning as related to performance was the addition of vocal recordings to the wiki. The incorporation of the recorded MP3 files posted on various public and private pages of the wiki gave students the chance to hear their own voices and to analyze their own singing. While recognizing that it is not always easy to hear our own voices in a recording, the students reflected on the value of this opportunity of listening to themselves sing through recordings on the vocal wiki. The following quotation from Samuel during the iteration one focus group interview articulates this idea well:

I don’t think that anyone likes to listen to themselves sing but I think that it’s something that, as singers, you need to do to get better. Because it helps when you can hear that you are off and stuff, I think that it is better than having someone tell you, you are off here, because you get used to hearing it yourself.

- Samuel, Grade 10 Student, Focus group interview, June 2012

Young people often develop vocal preferences and opinions through their own music listening, through engaging with entertainment technologies such as Wii, a video game console, or through watching popular television shows like American Idol where there is an emphasis on vocal performance and immediate critical commentary or feedback from a panel of experts. However, student vocal analysis, and immediate feedback through listening to themselves sing as a soloist or in an ensemble, is not as prevalent in music education. It is more common to have student ensemble performances be critiqued and given feedback from the teacher/conductor. Thus, the design feature of including solo and ensemble recordings on the vocal wiki made an important contribution to the changing pedagogical approaches in these music classes.
Iteration One: Role of the Teacher

During the first iteration, my main challenge was that of adjusting and changing aspects of my pedagogical approach as the class moved from the e-portfolio to the vocal wiki. Because I had worked with e-portfolios for many years, I was familiar with this form of process-based assessment and the learning goals of e-portfolio work. I was also very comfortable in my pedagogical approach to teaching and learning with e-portfolios in my vocal classes. In many ways, the challenge of designing and implementing the vocal wiki was as much a learning process for me as it was for the vocal students. Certainly, this technology integration challenged me to reflect on many aspects of my vocal music teaching and opened the doors for personal reflection and growth.

The main content differences between the pilot e-portfolio and the first version of the vocal wiki were the addition of the collaborative discussion areas and the ensemble and solo recordings. All of these changes were made to the wiki design in order to provide more opportunities for student reflection, collaboration, and empowerment. This occurred through increased peer collaboration through the discussion areas, as well as opportunities for critical listening and for the students to further develop musical and reflective skills through the recordings. The constant struggle throughout the study, reflected upon frequently in my researcher journal, was the changing nature of my role as the teacher. Did giving more opportunities for musical independence to the students mean that I should be doing less as the teacher? Exactly how much of the artistic decision-making process should I relinquish to the students? During the first iteration, I consciously tried to step back and allow for more student-centered learning to occur both by not commenting in the discussion portions of the vocal wiki and by allowing the students to express artistic ideas before stepping in and taking over a vocal
rehearsal. These may sound like simple steps but, as outlined in the first two chapters, this approach of not immediately getting involved and directing the music went against almost all of my training as a choral conductor and vocal teacher.

Additionally, I was worried that, without my explicit direction, the rehearsal process would be more time-consuming and that we would not be prepared for performances, which were a required part of my job as the choral director and vocal teacher. I continued to reflect on these issues throughout the study process as I also considered the potential benefits in student learning that the integration could create.

Although I eventually grew in my comfort level with my changing role, it was only through discomfort, as I navigated new pedagogical territories along with the students, that I was able to accept and eventually learn to embrace the changes in my role as the teacher.

**Iteration One: Impact Analysis**

The previous sections have outlined how the designed wiki curriculum tool facilitated student music learning through the dimensions of collaboration, reflection, and performance, as well as the effect of the wiki integration on the role of the teacher. Overall, vocal students at both the Upper and Senior grade levels effectively engaged in the collaborative, reflective, and performance-based areas of the vocal wiki. While it is not possible to make assumptions as to whether these students achieved stronger musical results in their vocal courses due to their engagement with the wiki, I can state, from observation as noted in the teacher/researcher journal, that the students were all active participants in the wiki project. Students demonstrated strong examples of reflective learning and collaboration through wiki use particularly through the vocal ensemble recordings and discussion pages.
Not only were there changes to the role of the teacher, as detailed in the previous section, but the students took more ownership of in-class ensemble rehearsals after the wiki recording process began. In years prior to the use of the wiki, students would have waited for teacher feedback or required prompting before making artistic comments on in-class rehearsal progress. However, after the first ensemble recording and wiki discussion, both Upper and Senior class students seemed eager to comment on the ensemble progress during class rehearsals and they arrived more prepared and focused for in-class rehearsals. The fact that the wiki served to position student dialogue and critical feedback as important to the ensemble growth process allowed an extension of these ideas into our in-class rehearsals, which in turn became more student-centered.

**Design Recommendations for Iteration Two: Lessons Learned from Iteration One**

While the results from the first iteration of the vocal wiki implementation were promising, there were a number of areas to further develop in all three dimensions of collaboration, reflection, and performance. The design recommendations for the second iteration came from initial analysis of the design, teacher/researcher journal reflections, and student recommendations from the first focus group interviews. The following section outlines the areas that were found to be lacking in the first iteration design and the design changes that would aim to improve upon them.

*Design recommendation one: Need for greater focus on student dialogue on the collaborative pages.* One of the key goals of the vocal wiki design was to foster collaboration leading to self-directed learning in music students. As compared to the pilot e-portfolio project, which only fostered interaction between student and teacher, students appreciated the opportunities to interact with peers in the wiki forum through the ensemble repertoire process.
pages. As was noted in the design evaluation, although the students were engaged in posting on the collaborative discussion pages, there were fewer examples of comment building and actual peer dialogue than expected. This is an area that was addressed in the second iteration design with the focus shifting to building on the comments of others and encouraging more succinct posts in the discussion areas. In order to foster more student dialogue, there needed to be modifications to the collaborative ensemble repertoire progress pages for the second iteration.

*Design recommendation two: Need for increased attention to the overall appearance and clarity of the vocal wiki, to overcome navigation issues.* Several of the design recommendations for the second iteration in the individual reflective areas had to do with the look and navigation of the wiki. One of the navigation issues that occurred during the first iteration was that students were confused between their individual public and private pages, often posting materials on the wrong page. Because the students valued the private space for reflections that would not be seen by their peers, this navigation issue created anxiety for several students. During the first iteration, the distinction between the types of pages was quite subtle: the public pages that could be seen by the class were labeled with the student name and the private pages were labeled with the student name and the word “project” added to the title. There was thus not sufficient distinction between reflective areas, nor clarity in the layout of the wiki, causing incorrect postings leading to possible anxiety or stress for certain students. This was a design area that needed to be improved in the second iteration of the wiki design. In order to avoid the wiki navigation issues that occurred in the first iteration, design changes were needed to the overall structure and appearance of the vocal wiki. Further changes, such as the addition of photographs, could serve to enhance the wiki while also encouraging community through increased personalization of the student wiki pages.
Design recommendation three: *Students need to experience more process work with their performance pieces, both ensemble and solo.* The design concept of posting ensemble performances on the vocal wiki for listening, reflection and discussion was effective, but needed to be further developed for the second iteration. This focus on progress needed to involve more than one example of the song, ideally, just as work on an essay would include more than one draft in the writing process. As mentioned in Chapter 2, Yancey (2009) notes that, in a language-writing context, it is through allowing writers to critique their own texts (reflection) that they can then make changes in these texts (revision). In the wiki design, there needed to be multiple opportunities for students to critique their musical progress at different points in the rehearsal process in order for them to make artistic changes and decisions about their performance practices.

Design recommendation four: *Stronger emphasis is needed on connections between student goals and the reflective process at the end of an iteration cycle.* Goal setting is certainly an important part of developing student self-directed learning skills. In order to extend the initial goal setting into the monitoring of goals throughout the school year, further reflective activities needed to be embedded into the vocal wiki design during the second iteration. Further reflection and connection to initial goals also served to encourage students to develop the ability to set realistic goals through monitoring and reflection.

Iteration Two: Design Analysis

The second iteration of this study was again conducted within the music curriculum in the Upper (grade 10) and Senior (grades 11 and 12) that involved development of vocal technique, application of the musical elements to performance, and development of overall student musicianship. The elements of individual and collaborative singing, listening, and reflection
were all, again, purposefully incorporated into the vocal wiki design. The general wiki structure from the first iteration - with the individual student public pages, collaborative ensemble recordings pages, and individual student private reflective pages - remained intact for this iteration, with several important design changes described below. Overall, there was an attempt to combine the most effective design features from both the pilot phase and the first iteration into this second iteration.

Integration of the Wiki into Overall Course Design

Several of the design changes from the first to the second iteration were related to the clarity and navigation of the wiki that emerged from student interaction with the wiki during the first iteration. These organizational design changes included the layout of the actual wiki in terms of putting the individual student private pages along the top of the wiki and the individual student public page links along the side to clean up the overall homepage and to make the wiki more attractive. These changes are illustrated in Figures 12 and 13.

Figure 12. Senior vocal class wiki, iteration two
Additionally, the private and public reflection pages were re-labeled with clear titles to avoid confusion and anxiety among students of where to post recordings or reflections that they did not wish to make public to their peers. For the second iteration, the navigation of the wiki was simplified by having the public and private pages labeled as such (i.e. “Sarah’s public page” and “Sarah’s private page”) to minimize confusion. This structural design change had a very positive effect on minimizing confusion in terms of wiki navigation and use.

During the second iteration, the vocal wiki remained a tool that could be used both in class, for ensemble recordings and written reflection, or outside of class so that individual activities could be completed during music homework time to enhance vocal practice and development. Students gave feedback that they felt that the wiki actually helped them to be more organized with their music practicing and reflection since they were able to locate and

Figure 13. Upper vocal class wiki, iteration two
listen to individual and ensemble recordings, read posts from their peers, and create their own written reflections all in one online location. Keeping in mind the unique nature of the study school, an e-school where all students are provided with tablet laptops, the vocal wiki was seen as helpful from a practical standpoint in organizing and focusing student performance work.

While ensemble recordings and videos were completed during class-time and later posted to the wiki, I deliberately encouraged students to do their listening and collaborative discussion posts outside of our vocal class time. This seemed to work better logistically and avoided technology issues, such as an introductory class during the first iteration where all students attempted to post on the wiki discussion page at the same time in class and not all posts appeared. To promote learning, I wanted the students to challenge themselves as individual listeners to form artistic opinions about what they were hearing and add their posts to the online collaborative discussion pages without being influenced by another student sitting beside them. Of course, some of the online discussion was further discussed in face-to-face class discussions, but this additional musical discussion occurred a few days later after students had posted their initial thoughts and reactions to the ensemble recordings on the wiki discussion pages.

As requested by the iteration one focus group students, there was a more detailed introductory session to the Wikispaces technology environment, the specific features of the vocal wiki design, and how to navigate the wiki for each class at the start of the second iteration. Another design change was the creation of a more formal wiki homepage with wiki goals and instructions clearly stated for ease of understanding by students. The collaborative ensemble repertoire pages were all re-named “repertoire progress pages,” along with the title of the current song being worked on by the class, as this was clearer for the students. Links to all of these pages were posted on the main wiki homepage for easier navigation. Finally, there was a
deliberate attempt to improve the appearance of the wiki by personalizing the homepage with a few fun vocal photos and cartoons as well as opportunities for students to add photos of their choice to their individual pages. These design changes to the appearance of the wiki made a difference in terms of student satisfaction, ease of navigation, and sense of ownership of the wiki tool, all of which were important when encouraging students to engage with a technology-based learning tool. Table 9 outlines the design changes that are detailed in the sections below.

Table 9

**Comparison of Design Features: Iteration One to Iteration Two Content**

<table>
<thead>
<tr>
<th>DIMENSION:</th>
<th>Iteration One: Wiki</th>
<th>Iteration Two: Wiki</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaboration</td>
<td>Collaborative discussion area</td>
<td>Collaborative discussion area</td>
</tr>
<tr>
<td>Collaboration</td>
<td>Public pages</td>
<td>Public pages</td>
</tr>
<tr>
<td>Collaboration</td>
<td>Student-selected photographs (public pages)</td>
<td>Composition process page (Senior vocal students)</td>
</tr>
<tr>
<td>Reflection</td>
<td>Self-evaluation with goals</td>
<td>Self-evaluation with goals</td>
</tr>
<tr>
<td>Reflection</td>
<td>Artifacts and individual reflections</td>
<td>Individual reflections (less emphasis on artifacts)</td>
</tr>
<tr>
<td>Reflection</td>
<td>Progress reflection (end of term, linked to goals)</td>
<td></td>
</tr>
<tr>
<td>Performance</td>
<td>Ensemble recordings</td>
<td>Ensemble recordings</td>
</tr>
<tr>
<td>Performance</td>
<td>Solo vocal recordings (works in progress, all Senior students posted a recording)</td>
<td>Video clips (vocal ensemble work)</td>
</tr>
<tr>
<td>Performance</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Collaboration**

During the second iteration, there was an increased focus on repertoire progress pages of the wiki design with the goal of fostering richer and more frequent collaborative discussion among the students. One of the key design features that contributed to this increased collaboration was the more frequent posting of recordings on the repertoire progress pages. A
slightly different approach was taken with these ensemble postings to encourage more critical analysis and discussion from the students. Each of the vocal classes recorded the same song several times at different points in the fall term and I posted two different recordings of the same song on the repertoire progress page. This posting of songs at different points of development allowed for increased critical discussion around the process of the vocal ensemble, much like examining drafts of an essay at different stages of development and comparing this progress. This was a significant design feature for the second iteration and is further discussed in the enactment analysis.

Additionally, the inclusion of a composition process page to the Senior vocal wiki allowed for students to share their popular song compositions with other members of the vocal class community if they wished to do so. All students in the Senior vocal class were working to complete the popular song composition assignment during the second wiki iteration, but it was their choice if they wished to post their composition on the wiki to share with others. All of the students in the Senior vocal class chose to post their popular songs compositions on the wiki and had opportunity to listen to and comment on the songs of their peers. Figure 14 shows part of the popular song composition process page from the second iteration.
A video posting was included to reflect some of the visual elements of performing including facial expression, movement, and choreography. The inclusion of video was a design feature meant to enhance the repertoire progress pages through additional media inclusion.

Finally, the fourth design enhancement to the collaborative aspect of the vocal wiki was the requirement of a photo on each student’s individual public page. Several students in both classes had chosen to post photos on the first iteration of the wiki to enhance their vocal biographies or to simply illustrate unique aspects of their personalities. For the second iteration, a student-selected photo became part of the requirements of the public page design. The photo selection was left to student choice in terms of subject of photo and what they wished to
represent with their selected photo. All that was required was that a photo be posted on each individual student public page.

Students in both Upper and Senior vocal classes responded positively to the design addition of the student-selected photographs on their individual public pages, with all study participants adding one or several photos to their public pages. These photos were an interesting visual representation of student self-identity ranging from more professional photos of students involved in musical activities to casual “selfies” and even photos of pets. Figures 15 and 16 illustrate examples of these student-selected photographs.

Figure 15. Individual public page exemplar, iteration two
The photos had the immediate effect of personalizing the individual student pages. Students also expressed that they were more likely to go and visit the public pages of their peers with the addition of photos, which gave the individual public pages a friendly, social and less academic feel to them. They looked more like a social media site, such as Facebook or Instagram that the “Net Gener” students (Tapscott, 2009) are familiar with and used to navigating, rather than the plain text of the previous wiki design.

**Reflection**

The vocal wiki structures that had successfully fostered reflection during both the e-portfolio pilot and iteration one phase remained in the iteration two cycle, such as the vocal biography and self-evaluation assignments. The main difference was a decreased emphasis on frequent and lengthy individual reflective pieces during the second iteration. There was a
deliberate move away from the formal artifacts with reflective analysis that had been the structure in the pilot and first iteration towards accommodating more student choice in terms of structure and length of individual reflective posts. The second iteration wiki design maintained the individual student private pages, where students could post individual reflections that they did not wish shared with their peers, as well as the public pages where reflections and photos could be shared with peers.

The main design addition to the reflective dimension was the creation of the progress reflection assignment, which occurred at the end of the term with the purpose of providing a clear link to individual student goals. The skills of monitoring and reflecting on goals are key aspects of student-regulated learning (Zimmerman, 2000). The intent of this culminating reflective piece was to encourage students to reflect on their goal progress and personal learning after only 12 weeks of engaging with the vocal wiki with the aim of further developing student-directed learning throughout the year.

In terms of the individual reflective wiki content, both the Senior and Upper vocal classes demonstrated full participation by completing all required portions of the wiki, with many students choosing to go beyond expectations. For both the Senior and Upper classes, the overall wiki content was far less lengthy with more concise writing during the second iteration, likely due to the design changes with regards to the individual reflections. Because of the successful enactment of the individual reflective sections during the first iteration with all students meeting and, in many cases, exceeding expectations, the second iteration had slightly fewer reflective assignments and requirements. The second iteration design featured more student-directed wiki content in terms of more choice in the reflective assignments, more of a collaborative focus on peer critiques and discussion, and the inclusion of more solo and ensemble recordings.
The Upper vocal class had two required individual reflections, and all students completed between two and five individual reflections with the average being three individual reflections per student. The Senior vocal class had three required individual reflections and all students completed a minimum of three and a maximum of six individual vocal reflections with the average number being four. Therefore, most students completed more than the required individual reflections and all students completed the newly added culminating progress reflection linked to their initial musical goals.

In most cases, the extra reflective work that students chose to include on the wiki was posted in the private section and had to do with another aspect of their musicianship outside of the vocal classroom, such as a reflection on learning to play the guitar or the inclusion of an MP3 file of a song that they had composed and recorded and wanted to share with me. It was so encouraging to see that the students were becoming more accustomed to the reflective process and that many chose to include reflections on events that occurred in their own musical lives outside of the classroom. The design feature to give more freedom to the students on numbers of reflections and reflection topics, outside of the few required reflections, seemed to work well with these groups of students. It should be noted that these were students who were choosing to take music as an elective course and therefore, fairly highly motivated; however, it was still exciting to see this level of engagement with the vocal wiki in the area of reflective learning.

**Performance**

Again, the vocal wiki for both classes was performance focused overall due to the many ensemble performances occurring in the required class curriculum. The use of performance recordings on the wiki increased in the second iteration with more frequent ensemble recordings for both classes and the introduction of solo or small ensemble recordings at the Senior vocal
class level. The two major design additions to the second iteration vocal wiki were the inclusions of the solo vocal recordings and the video clips of ensemble work.

The inclusion of the solo vocal recording at the Senior vocal class level was intended to give students further opportunity to hear their own voices, in this case, their individual voices, and reflect on what they were hearing. Students were asked to record a work-in-progress from the class repertoire songs in a solo or small ensemble format. The solo work-in-progress recording was not introduced at the Upper vocal level since approximately half the class was new to the vocal music program and exhibited anxiety with regards to solo singing. The second iteration also occurred at the beginning of the school year and the grade 10 students were not all ready, in terms of vocal experience, vocal skill, and comfort level to record solo and small group performances. Several students posted their recordings along with photographs (selfies) taken in practice rooms from their recording processes as illustrated in Figure 17. Students tended to write brief point form reactions on their pages immediately after they recorded the solo and wrote their longer reflective pieces in the following few days.

![Figure 17. Solo or small ensemble recording, senior vocal class, iteration two](image-url)
Video clips of ensemble repertoire were included on the vocal wikis to give students opportunity to reflect on different performance practices, such as facial expression and movement through this new medium. The goals of expanding the second iteration vocal wiki to include solo recordings and video content were to give the students more opportunities to hear themselves in different settings, solo as opposed to large ensemble, and to see themselves perform as opposed to only hearing audio recordings. Ideally, the student experience of engaging with these new recording formats and reflecting on what they heard and saw would ultimately lead to increased independent musical decision making.

The musical content of the Senior vocal class ensemble process pages for the second iteration was made up of two contrasting songs. Vocal repertoire for the Senior vocal class was selected by both students and the teacher. The songs included: “La Lluvia” which is an a cappella song depicting rain through music set to syllables as text written by Canadian composer Stephen Hatfield and “What I Did For Love” from the musical A Chorus Line by Marvin Hamlisch and Edward Kleban.

For the Upper vocal class, the musical content of the ensemble progress pages consisted of three contrasting songs: a mash-up arrangement of “The First Nowell” and Pachelbel’s “Canon in D;” an arrangement of “N’Kosi Sikelel’i Afrika,” which is sung in the Xhosa language and currently the national anthem of Tanzania, Zambia, and a part of the South African national anthem; and the song “One” also from the musical A Chorus Line by Marvin Hamlisch and Edward Kleban. Ensemble repertoire for the Upper vocal class was also jointly selected and agreed upon by students and the teacher.
Iteration Two: Enactment Analysis

The design changes from the first to the second iteration of the vocal wiki had a significant effect on the implementation and enactment of the vocal wiki in the second iteration. In this enactment analysis, I evaluate the students’ participation in the vocal class wiki to give insights into the impact of the design and to inform discussion as well as future iterations.

The second iteration vocal wiki for both the Upper and Senior classes consisted of individual student public pages with vocal biographies and photos, two ensemble recording pages with multiple recordings and collaborative comments, and individual student reflective private pages. For this iteration, there was less of an emphasis on the individual private reflections with only two required reflections for the Upper class and three required reflections for the Senior class including the self-evaluation, the progress reflection, and the solo recording reflection for the Senior vocal class.

As was the case during the first iteration, there were students in both classes who chose to go beyond these minimum expectations and added additional reflections, photos, or recordings to the wiki. Additionally, as in the case of the first wiki iteration run, students were aware that extra marks were not being awarded on quantity of wiki work, with the exception of the required content as outlined above.

Collaboration

The more frequent recordings on the repertoire progress pages allowed for the student online discussion to become a more regular part of vocal wiki interaction. In particular, the design change to include several recordings of a song-in-progress from each vocal class fostered a slight increase in discussion among the students. This increase is illustrated in Table 10. The addition of the video clips also fostered much discussion among the students. In both classes, all
students participated in the collaborative wiki discussion and there weren’t any students who did not engage in this area of wiki participation.

Table 10

*Collaborative Wiki Quantitative Engagement, Iteration Two*

<table>
<thead>
<tr>
<th></th>
<th>Total Number of Students</th>
<th>Number of Students who participated</th>
<th>Number of Posts</th>
<th>Total Word Count of all Collaborative Posts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Vocal</td>
<td>16</td>
<td>16</td>
<td>43</td>
<td>1874</td>
</tr>
<tr>
<td>(Grade 10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior Vocal</td>
<td>16</td>
<td>16</td>
<td>62</td>
<td>1560</td>
</tr>
<tr>
<td>(Grades 11/12)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The coded analysis of the second iteration data illustrated a few interesting patterns. Students who had been a part of both iterations showed improvement overall in their collaboration scores. I have referred to this group of students throughout iteration two as the “repeated exposure” group since they had exposure to the vocal wiki through two iterations in contrast with those students who were only a part of the first wiki iteration. This was due to either students graduating in June 2012, joining vocal in September 2012, or leaving the vocal program. The repeated exposure group was made up of 13 students in total: four grade 11 students and nine grade 12 students in iteration two.

The coded analysis also showed that the grade 10 students who were new to the vocal wiki tool (the “iteration two only” group) had high ratings on the collaboration dimension. Their discussion was strong, and demonstrated actual collaborative work in terms of reading and building on the thoughts of their peers. This was likely because collaboration was more of a design emphasis in the second iteration with increased opportunities for collaborative discussion and structures that supported collaborative discussion. Additionally, this could be further
explained by teacher comfort level and experience with the collaborative wiki sections in terms of the effects of the first iteration on my pedagogical approaches.

Once again, all student contributions were further coded in terms of the content analysis coding schemes, revealing patterns of student engagement. This analysis also showed that more discussion and interaction occurred in the second iteration for the Senior vocal class through the increased discussion, social cues, and constructive comment codes. This can be seen in Figure 18 which reflects patterns in the following codes: positive feedback (P), negative feedback (N), constructive feedback (C), discussion or interaction (D), and use of social cues (SC). Most of the students in the Senior vocal class, the repeated exposure group which represented 13 out of 16 students, had experienced this type of collaborative discussion in the ensemble process pages during the first iteration. The effect of the repeated exposure to the vocal wiki tool seemed to enhance the intended student engagement in the area of collaboration.

![Figure 18. Coding of collaboration, iteration two](image)

Looking at the content analysis from the Upper vocal class, the posts in the ensemble progress pages were more critical and constructive in this second iteration than they were for the Upper vocal group in the first iteration. This was demonstrated through appearances of negative and constructive codes. This observation is directly attributed to design changes of the vocal
wiki as well as teacher experience and changes in pedagogical approaches since there are no crossover students between iterations one and two in the Upper vocal classes. All 16 students in the Upper vocal class for the second iteration are new to the vocal wiki. The overall tone and content of the Upper vocal class for the second iteration is equally conversational and interactive as the first iteration Upper class, as demonstrated by discussion and social cues coding.

Overall, the students engaged in discussion regarding their progress as a vocal ensemble much more effectively in the second iteration than the first. Students were also more specific in terms of noting aspects of vocal growth and development in their discussions. As noted in the content analysis, students also added more constructive posts, perhaps in an attempt to take the class ensemble to the next level with their interpretations of the songs. The design feature of more frequent recordings and recordings of works-in-progress on the repertoire progress pages were key to the increased development in collaborative discussion.

Finally, the inclusion of the student-selected photos on the individual public pages was a positive design change in the creation of community through the wiki. The addition of these photos was very popular with the students and, according to their feedback in focus group interviews, motivated them to visit other individual public pages on the wiki to see the photos and vocal biographies. This sense of individual expression through the student-selected photos contributed to a sense of wider community through the more friendly look of the wiki with photo additions and better reflected the atmosphere that we strive to create in our face-to-face vocal classes where collaboration through the creation of a safe space and supportive community are key.

The addition of the composition process page to the Senior vocal wiki also fostered this sense of individual expression in a supportive context for the students. This was not a required
wiki posting, since I did not want students to feel apprehensive or nervous about posting their personal song compositions in a shared area, but the students all chose to participate and share their popular song compositions with their peers in the class community.

Senior vocal students reflected on their perceived differences between posting their popular song compositions (which was not required) versus posting other solo or ensemble singing recordings in focus group interviews:

Dan: *Because, it’s like, I wrote it and.... Like if someone critiqued me negatively in a solo that I didn’t write, then I would be like, ok I can just alter my singing. But if it’s something that I wrote and sang [that was critiqued] then it would be like everything is my fault.* [Laughter]

Caron: *At the same time, I feel like everyone was very supportive and stuff. Plus, I liked hearing all of the songs!*

Dan: *Everyone was really supportive, yeah....*  
- Senior Vocal Class, Focus group interview, June, 2013

This notion of individual expression and personal identity being connected to song compositions reoccurs again in the case study section.

**Reflection**

Coded analysis of the reflective aspects of the second iteration yielded several significant results. Firstly, for the repeated exposure group in the Senior vocal class, more than half of this group of students improved on their reflective scores for the second iteration. All of the repeated exposure group stayed the same or scored higher in terms of their reflective dimension codes and many of the students chose to build on their goals from the first iteration, which was a good indication of the depth of their reflective work and their increased understanding of long-term musical goals. Second iteration Senior vocal reflections were shorter in length overall, but just as rich in content quality as the first iteration reflections with similar strong self-analysis content.
From a design perspective, the second iteration focused on more frequent performance recordings with shorter critical posts in the collaborative sections. There was also a deliberate move away from the lengthy individual e-portfolio style reflections that had frequented the iteration one individual pages. With the addition of the end-of-term progress reflections that linked back to initial student goals, there was a clearer connection to the self-regulated learning skill of realistic goal setting and goal monitoring over a period of time. This culminating reflective activity proved to be significant for students in helping them to stay connected to their vocal goals. For certain students, the culminating reflection also allowed them to realize that their musical goals could extend beyond the school year into their future studies. Eileen, a grade 11 student during the second iteration, articulated these metacognitive connections in an excerpt from her final reflection:

*I do feel my goals set at the beginning of the year were very realistic for me as a singer. They were all little things to improve but I definitely feel that I have successfully achieved a lot of the goals I set for myself. I feel for S2 [grade 12 year] I will probably expand into similar but some more difficult goals to work on. I think the process of reflection this year has been very helpful. It’s great to set goals for yourself so you can have something to work towards and be proud of when achieved. Goal setting is a great way to work on something you may not be as good at to try and improve it. I definitely want to keep writing down and thinking about my goals next year.*

- Eileen: Vocal wiki excerpt, Iteration Two

The second iteration Upper vocal class scored surprisingly low on the reflection dimension as compared to the other groups. This is particularly surprising as this group had scored higher than the Seniors on the collaborative dimension in the previous iteration. This is thought to be partly due to the second iteration design focus with more of an emphasis on the collaborative dimension, but also due to my pedagogical emphasis on collaboration. It should also be noted that this group did not have any previous experience with either the e-portfolio...
from the pilot phase or with the first iteration wiki, so they were less experienced with reflective thinking and writing than all of the other groups.

The coding illustrated strong reflections for the Senior vocal class with weaker reflective scores for the Upper vocal class during the second iteration. The coding of student reflection scores is shown in Figures 19 and 20, with separate graphs showing the average reflection score for Upper and Senior students.

There was a statistically significant difference between Upper ($m=2.56$, $sd=0.63$) and Senior ($m=3.63$, $sd=0.50$); $t(30)=5.29$, $p=0.00$. In contrast with the first iteration Upper and Senior classes, where all students were involved in the pilot e-portfolio phase and all had more experience with reflective writing, the Upper students in the second iteration were all new to the reflective vocal wiki. Further, 13 of the 16 members of the Senior vocal class were part of the repeated exposure group who had all experienced iteration one.

![Graph of upper vocal reflective scores, iteration two](image-url)
Figure 20. Graph of senior vocal reflective scores, iteration two

Coding scores show that the repeated exposure group all improved or maintained the same reflective score from the first to the second study iteration. These results are illustrated in Figure 21.

Figure 21. Graph of repeated exposure reflective scores, iterations one and two
Performance

An important design addition to the performance dimension of the vocal wiki was the solo or small group recording at the Senior vocal level. Perhaps because this was an extension of an assignment that is normally given in class called the repertoire checkpoint test, there were no issues in the completion of this assignment. All students completed the solo or small group recording and posted it to their private page for further reflection. As was the case in the first iteration, all students also participated in the vocal ensemble recordings as well as the video recording since these were taken during class rehearsals. Students were excited to engage in this process and were especially eager to add the video component to the performance portion of the vocal wiki, as noted in the teacher/researcher journal.

There were two other additions to the vocal performance aspects of the wiki enactment and both additions were student initiated. Firstly, the Upper vocal class decided to create a practice page on the wiki where they posted student-created recordings of individual vocal parts. The MP3 practice recordings were created by our student accompanist who took the time to play and record each individual vocal part on the piano. Interestingly, this practice page was created in the middle of October, which was relatively early in the wiki process, after we had posted only one ensemble recording on the vocal class wiki.

The Senior vocal class students created a sub-section on each of their ensemble progress pages where they posted YouTube recordings of other vocal ensembles, choirs, and solo performers singing their performance pieces. They used this page as a point of reference in verbal discussion and online commentary of where they wished to take the performances of the same songs that we were preparing in the vocal class. These two student-initiated additions to the vocal wiki fit well with Collins and Halverson’s (2009) ideas of learner control and
customization in technology-enhanced learning environments as well as the increased exposure to experts in all fields through technology. It was encouraging to observe the creation of both the Upper practice page and the Senior YouTube page since these additions came from the students directly as they interacted with the wiki technology during the second iteration cycle.

The coding of the second iteration performance data showed that the students were consistently strong, overall. The coding of student performance scores is shown in Figures 22 and 23, with separate graphs showing the average reflection score for Upper ($m=3.50$) and Senior ($m=3.81$) students.

Figure 22. Graph of upper vocal class performance scores, iteration two
Figure 23. Graph of senior vocal class performance scores, iteration two

Because of the strong performance focus of the music program and the senior level of these students, who had chosen to take music as an elective, these results were not surprising.

The main design changes that affected the performance portion of the vocal wiki pages were the increased postings of ensemble process recordings, the inclusion of video clips to enhance performance reflections, and the addition of a solo work-in-progress recordings from members of the Senior vocal class. The increased postings of ensemble recordings were discussed from the perspective of the collaboration dimension, but this design change also had an impact on the performance developments of the vocal classes. In general, the increased student focus of listening to their own voices in ensemble settings paired with collaborative critical reflection encouraged more self-awareness and student interest in artistic decision-making of ensemble repertoire. This was reflected in both the wiki comments and the focus group feedback.

Two Senior students, Stephen and Rebecca, reflected on this aspect of vocal ensemble progress from the vocal wiki recordings in the following excerpts:
I think for the ensemble pieces, it was more of like understanding how a group or team works when singing a song. I remember there was one comment that I made, I forget exactly what song it was, like the sopranos were singing way too loud at this part where it should be the altos coming out at this part. So, you understand how the team presents itself as opposed to just like specific things about a song.

- Stephen, Grade 11 student, Focus group interview, June, 2013

We were able to look into the depth of the lyrics more because after recording and listening everyone was more like emotional in the song and actually portraying the lyrics.

- Rebecca, Grade 12 student, Focus group interview, June, 2013

My reflections in the researcher journal also noted that students in the second iteration contributed more during face-to-face class rehearsals, drawing on musical and technical elements that they had heard on the vocal wiki in their comments. Thus, the vocal wiki discussion seemed to facilitate higher-level classroom discussion about vocal ensemble progress and artistic decisions such as dynamics, tempo and musical phrasing.

This increased student involvement prompted me to take a step back and allow the students to take greater leadership of the musical process during class rehearsals. This was a difficult pedagogical process for me to undertake, as a conductor, but an important step in my attempt to let go of the artistic control and facilitate more student artistic leadership in our music-making.

The inclusion of video clips fostered a sense of physical awareness for the students because they could observe their own embodiment of the songs. They could also quickly see how effectively they were expressing the music with facial expressions, or lack thereof, and movement. The Senior vocal class noted these ideas in their collaborative reflections on facial expression and embodiment of emotions for the piece “What I Did For Love” and the Upper vocal class focused their discussion on the choreography for the song “One.” This inclusion of video clips on the wiki also led to discussion regarding the similarities between the art forms of
dance and music. This theme that emerged from wiki discussion comparing elements of the performing art forms of dance, drama, and music has been further discussed in the final dissertation chapter.

There was mixed reaction to the Senior vocal class assignment of posting a recording of a vocal practice session on the private reflective page of the wiki. The pedagogical goal of this assignment was to highlight the solo vocal development of the Senior vocal students, as opposed to the focus on their voices within the ensemble. To clarify, Senior vocal students had all experienced “repertoire checkpoints” in past vocal courses, as well as during this course, as a quick way to ensure that they were practicing effectively and progressing with their vocal parts in ensemble repertoire. The repertoire checkpoint was done as a solo or in a small group of mixed voices, meaning the small group would consist of students singing different vocal parts with no-one on the same vocal line, where each student sings a small section of an ensemble song. This is a brief and straightforward performance assessment intended to allow the teacher to hear how the students are progressing in their individual vocal technique skills, as applied to performance repertoire, as well as the musical accuracy of the song.

As noted in the researcher journal, there were a variety of emotional reactions when I asked the Senior vocal students to record their repertoire checkpoint and post it on their private pages as opposed to singing the repertoire checkpoint for me, in a face-to-face setting, in class. Because this was the first time that I had asked them to record themselves singing a solo or small ensemble repertoire checkpoint, the students were given class time to complete this brief recording consisting of three to four minutes of singing, exporting it as an MP3 file, and posting to their private page for their listening and reflective comments.
Many of the grade 12 students quickly completed the assignment with no questions or concerns. A few of the other grade 12 students expressed how challenging it was to record their own parts but, after going through the process, they came to the realization that this would ensure that they really knew their parts in one of our more difficult songs. One of the grade 11 students was visibly upset at the end of class and came to chat with me about the challenges that he had faced with the recorded repertoire checkpoint. His main issue was that he was having difficulty completing the recording process and listening to himself sing the short song excerpt because he did not know his part as well as he had thought. While not a positive moment for him, this was a turning point in terms of hearing his own voice and realizing what he needed to do musically to get to where he wanted to be vocally. It also demonstrated to me the disconnect between this student’s actual musical skill level and his metacognitive awareness of his vocal music skill level because he seemed surprised and upset that he could not accurately sing his vocal parts. This awareness of needing to improve, but not sure how to effectively do so, connects back to Lehmann and Davidson’s assertion that learning how to practice effectively is a skill that needs to be acquired through deliberate teaching and learning (2006).

Another group of grade 11 students decided to record the repertoire checkpoint as a small ensemble and, since they were all singing different vocal parts this was permitted. They came to me at the end of the class with positive feedback about the work that they had accomplished. They were excited for me to listen to their progress that they had documented through two MP3 recordings that they had posted on the wiki. They had recorded two versions of their repertoire progress check: one early take, which was highly unsuccessful and ended in gales of laughter on the MP3, followed by a later take, after they had taken time to practice their parts and isolate musical problems as a small ensemble, that was much more successful. This group commented
that they enjoyed the recording process because it allowed them to listen to each recording and identify both individual and ensemble musical issues such as intonation problems, incorrect notes or rhythms, and ensemble issues such as lack of vocal blend or non-unified vowels. The process that this group engaged in for their ensemble recording showed similarities to Lucy Green’s collaborative music learning project (2008), which involved open-ended learning outcomes, a high degree of student autonomy, and a low level of teacher direction. Although the repertoire checkpoint task was not designed with open-ended learning outcomes, several students chose to interpret the task in different ways and through different processes. This group of grade 11 students also commented at the end of the class that they were pleased with what they had accomplished without my involvement. It was clear to me that they valued the autonomy to rehearse and make musical decisions without always having teacher direction and involvement.

It was encouraging to observe how the Senior students all engaged with and learned from the repertoire checkpoint recording process in a variety of different ways. I was surprised how many different emotional reactions this short assignment led to among the Senior students. As noted in the research journal, one of the grade 11 students stayed behind after that class to chat about a traumatic personal experience that she had recently had where stage fright overcame her as she was singing a solo in a music festival. She reflected on how the process of recording her own voice and listening back was helping and supporting her in dealing with her anxiety as a performer. I appreciated that this assignment, again, provided me with opportunities to connect with the vocal students and discuss issues such as vocal goals, stage fright and anxiety.
Iteration Two: Analysis of Repeated Exposure Group’s Self-Reflection Processes

The repeated exposure group, consisting of 13 students who were part of both iterations, provided a unique opportunity for further examination and analysis. As outlined in Chapter 3, after the coded analysis was complete, there was a second scoring in the area of self-reflection which combined aspects of three of the initial codes: self-awareness (SA), identity development (ID) and metacognitive engagement (MC) codes. The resulting combined code was labeled self-reflection, for which both the repeated exposure group and the second iteration group were scored. The entire second iteration group was scored to ensure that the self-reflection scores were not overly high in the second iteration due to design changes and improvements.

I use the term “self-reflection” to describe the process for exploration into one’s own experiences and practices. I extend my concept of self-reflection to incorporate the following two components from self-regulated learning literature: self-judgment, including self-evaluation and casual attribution, and self-reaction, including self-satisfaction/affect and adaptive or defensive responses (Abrami et al., 2011; Zimmerman, 2000).

The results of the self-reflection scoring indicated that all of the students in the repeated exposure group maintained or improved their self-reflective scores from the first to the second study iteration as illustrated in Figure 24. There was a statistically significant difference between the self-reflection scores of repeated exposure group during the first iteration ($m=2.77, sd=0.83$) and of the same group during the second iteration ($m=3.46, sd=0.75$); $t(12)= 5.74$, $p=0.00$. 
These results indicate self-reflective growth in the 13 repeated exposure group students throughout both study iterations supporting the idea that self-regulated learning processes can be developed and improved through deliberate exposure and practice.

**Iteration Two: Role of the Teacher**

The changes in my role as the teacher were much more challenging for me during the first iteration, as reflected in my research journal. I found that during the second iteration, I had adapted more easily to a pedagogical approach that encouraged further student independence and autonomy as well as less teacher direction. I think that this growth had to do with both my own comfort level in working with the wiki tool as well as the changes that the vocal students exhibited during the second iteration. For example, during the second iteration, vocal students contributed more to musical discussions in face-to-face rehearsals, often building on elements that had previously been posted in wiki discussions. This increase in student involvement during
our rehearsal processes led me to direct less and instead to allow the students to lead more aspects of the musical process in class rehearsals.

This process was cyclical in nature in that, as I became more relaxed and confident in my shifting role as the vocal teacher who encouraged student-centered learning and artistic decision-making, so, too, did the students embrace their new roles and participate more actively both in wiki and face-to-face classroom discussion and musical leadership.

Further, it gave me confidence knowing that even though the rehearsal process was different through this pedagogical approach, in that it was more time consuming with added unknown outcomes for me because I was not making all of the artistic decisions, the vocal classes were still able to fulfill the required course expectations. In fact, performances were becoming stronger, musically, and more meaningful for all members of our vocal classes because students were critically listening to recordings of our musical processes, becoming more aware and more involved in how to improve as singers, and more engaged in the overall artistic decision-making. It was exciting as a teacher and as a researcher to be a part of this shared musical energy and enthusiasm about learning. This is not to conclude that I was completely comfortable in the shifting teacher role, nor that I didn’t - from time to time - fall back into a more teacher-directed rehearsal mode, if a performance date was growing close. There were still moments of uncertainty and questioning that will likely continue throughout my teaching career. However, overall, my confidence in challenging my own pedagogical perceptions of my role as the teacher and conductor had grown throughout the design process.

**Iteration Two: Impact Analysis**

Although the second iteration of the wiki involved a greater range of elements, such as the progress reflections, solo vocal recordings and video clips, the actual integration of the wiki
into the vocal courses was very smooth. Again, students engaged effectively in reflective learning, collaboration, and all performance aspects of the vocal wiki. Overall, all elements of the wiki seemed to flow more naturally and easily during the second iteration. Of course, there were several factors for this effective integration including teacher/researcher learning, growth and increased confidence from the first iteration and the sense of transfer and growth that the repeated exposure group, who had all been a part of the first iteration, brought to the second iteration. The second iteration also came at the beginning of the school year and perhaps this timing also supported the implementation; it is often effective to introduce a new project at the start of the year.

The second iteration also featured more technology scaffolds built into the wiki, such as the increased recordings, to ensure opportunities for student learning and development. Although there were slightly more elements added to the wiki design for the second iteration, the timing and curriculum time remained relatively the same as for the first iteration. The addition of further learning activities, such as the individual student progress reflection that was linked to initial vocal goals, provided support for student growth and allowed for connections to be made between different aspects of the vocal course. The integration of these scaffolds and activities into the wiki design was effective in the overall impact on student learning. This was demonstrated through the student engagement with the wiki, particularly in examining the repeated exposure group of students, whose scores in the performance, collaboration, and reflection analysis areas either increased slightly or remained consistent. Additionally, the Senior students all contributed more recordings to the wiki, including solo and small ensemble recordings as well as songwriting process recordings. The Senior students also contributed more
posts in the discussion pages with increased examples of collaborative discussion in terms of building on the opinions and reflections of other students.

**Design Recommendations for Future Iterations: Lessons Learned from Iteration Two**

The second iteration of the vocal wiki had a number of design improvements with increased focus on process and collaborative community building. The emphasis on process through the wiki was reflected in the changes to the ensemble recording pages with more frequent posting of student recordings as well as the addition of the solo work-in-progress postings. Additionally, the second iteration design was stronger in terms of layout and clarity and included the new media of performance video clips to enhance student-performance development on a more comprehensive scale. However, despite these improvements, there were still several challenges in the design and enactment of the curriculum. These challenges are described below in the form of design recommendations, which may serve to guide revisions to the wiki technology tool itself or to pave the way for future designs.

*Design recommendation one: Encourage more peer interaction on the wiki.* Although the collaborative discussion areas were more effective in the second iteration, the area of collaborative reflection and online community building is one that can be continually improved in the wiki design. In focus group interviews, students reflected on being positively motivated by feedback from peers on the wiki, rather than just feedback from the teacher. Some of the focus group discussion centered around the idea of creating more discussion opportunities on the vocal wiki that were not connecting to repertoire and that were closer in format to social media. A design recommendation that came from one of the students was the introduction of an instant messaging format that could be added to the vocal class wiki. This would allow for discussion and comment building even when all members of the vocal class were online at the same time, for
example, during certain class periods. We ran into a few technical issues when too many members of the class were online at the same time in terms of comments being accidentally deleted or comments not appearing on the wiki. A new instant messaging type feature could create spaces for planned synchronous discussion on the wiki site, as well as offer an attractive option for shorter posts and exchange of ideas.

_Design recommendation two: Welcome more voices to the wiki by including a wider community of peers and experts._ Building on the motivating aspect of variety in feedback, another design recommendation was to make certain sections of the vocal wiki available to other vocal music students outside of the class. This would allow for others to listen and comment on works-in-progress or more performance ready recordings. I discussed this idea with the student focus groups and they liked the idea in theory, but suggested some aspect of anonymity be added to this feature. For example, if we were to open the wiki up to more music classes, perhaps the names could be kept confidential so that the resulting anonymity would not bias their constructive comments.

Students at both the Upper and Senior levels greatly appreciated the perspectives of guest artists who visited the class to give feedback and advice on singing and performance technique. Perhaps outside guest experts could listen to student recordings and give valuable feedback through the wiki forum. Guest artists come into the vocal classrooms several times a year to lead workshops, listen to student performances, and give constructive feedback. It makes sense to extend this learning and outside expert perspective to our online context through the vocal class wiki. This connection to an outside expert perspective aligns with Collins and Halverson’s idea of the comparison of performance with the performance of experts as an important learning skill that can be further enhanced by technology (2009).
Design recommendation three: Improve the quality of the sound recording and playback features. The solo vocal and ensemble recordings gave students a chance to hear not only their own voices, but also other vocal parts, giving them the sense of listening as a conductor and getting the whole musical picture. This is a valuable skill to develop in terms of increasing artistic leadership and promoting self-directed learning. Senior vocal students also noted that the small group or solo practice recordings were excellent tools for the development of aural skills and general musical skills such as pitch and rhythmic accuracy. Students expressed slight anxiety around the quality of the recordings posted on the wiki space and not being able to accurately hear their own voices at times due to poor quality. Additionally, I noted in the teacher/researcher journal that the recordings were not very high quality and would often make voices sound slightly “thin” when played back through certain computer speakers. An easy design change stemming from this feedback would be to upgrade the sound recording technology to something a bit more advanced, such as Audacity, combined with a better sound recorder and better speakers. Therefore, there would be higher quality recording equipment for the recording process as well as higher quality speakers for the listening portion, which would more accurately represent the student voice.

Design recommendation four: Include more video clips at different periods in the artistic process. Another design recommendation for future use of the wiki tool was the incorporation of more video clips during the process part of music learning, not simply posting video clips of completed performances, which is what occurred in the second iteration during the video clip implementation. The more frequent posting of video clips posted during the performance process would be helpful in developing facial expression when singing as well as performance movement and choreography. Ensemble growth, vocal technique skills, and performance
processes could be enhanced through the posting of both audio and video recordings, including those of the same song, at different points during the music learning process. This would facilitate student discussion and reflection, as well as provide opportunities for teacher engagement on a more comprehensive spectrum of musical exemplars that include both aural and visual feedback.

These design recommendations are meant to both summarize ongoing challenges in the vocal wiki tool stemming from the second iteration as well as guide revisions to the wiki for future iterations or designs. The next chapter offers a more detailed analysis of the individual student experience of the vocal wiki intervention in the form of three case studies that explore reflective musical growth.
CHAPTER 5: Case Studies of Three Vocal Students

This chapter presents three case studies that were conducted to allow for a deeper exploration into the individual student experience of the vocal wiki intervention. The purpose of these case studies is to shed more light on three aspects of reflective musical growth that emerged from data analysis: musical identity development, collaborative learning, and self-reflective and metacognitive engagement. The case studies offer more detailed illustrations of the specific student experiences in this study and can serve to support and enhance the earlier data analysis (i.e., in chapter 4).

Because of the action research orientation as the teacher/researcher, I had the opportunity to observe these case study students in the classroom environment for long periods of time. I saw the students three times a week in vocal classes, observing their interactions, their learning development and their growth as young people in a way that would only be available to a classroom teacher. This teacher/researcher position, coupled with the reflective student narrative data, gives depth and richness to these case studies.

The case study students were selected to represent a range of gender, age, vocal experience, and vocal level, and are provided with pseudonyms to protect their identity. Each case study begins with a detailed description of the student, including their musical background and overall study participation. Following this, each case study outlines the student’s journey through the themes of reflective musical growth by drawing on wiki contributions as well as focus group comments. The wiki reflections, both individual reflections and collaborative discussion entries, made up the majority of the case study data and are quoted directly whenever possible. However, no reflective entries or focus group comments were quoted if there was any
possible compromise of confidentiality. The chapter concludes with a discussion of the three cross-cutting themes across the case studies and general interpretations.

**Harry: From Class Clown to Leading Man**

Harry had been enrolled in the vocal music program since grade 7 and he studied vocal music as a course through his secondary school years until he graduated. Harry began singing as a boy soprano with a beautiful voice, but with no musical training, before he started in the vocal program. He approached singing with enthusiasm, confidence, and a sense of humour. Harry’s class clown personality and confidence made him a popular leader within the vocal class. Harry was always a strong singer and performer with solid musicianship skills. Outside of the vocal class, Harry was involved in the choirs and the school musicals throughout his high school career. Harry was also a strong athlete and was involved in the school’s hockey program. Harry was in grade 11 for the first iteration of the vocal wiki and in grade 12 for the second iteration, making him a part of the “repeated exposure” group of students who engaged with the vocal wiki through two iterations.

**Harry’s Musical Identity**

Drawing on Woodford’s definition of identity as the imaginative view that individuals project for themselves in particular social situations (Woodford, 2002), Harry’s musical identity development can be traced through his wiki reflections and discussion during two school years and two study iterations.

Beginning with his vocal identity, Harry quickly identified himself as a tenor, the highest male voice part, in the first line of his vocal biography in both iterations. He was very proud of his more recent formal musical training and experiences, including school musicals and choir,
because he focused primarily on listing these experiences in his vocal biography. Along with mentioning the many musical theatre productions that he had been involved with as a lead performer, he also mentioned his interest in hockey as well as his desire to be more engaged in leadership through the arts in his grade 11 biography:

Harry is most interested in singing musical theatre music. Harry also plays hockey in his free time. In the future, Harry plans on becoming more of a leader in the arts for his senior year, and is currently playing [lead role] in this year’s musical. Harry has been performing in choirs since he was 8 years old.

- Wiki reflection, April, 2012

In his grade 12 vocal biography, Harry added the new focus of his leadership roles with statements about his student directing of the middle (grade 7 and 8) school musical and choir leadership roles. It was interesting to note that Harry positioned the leadership involvement as a goal in his grade 11 vocal biography and then actually fulfilled it by actively seeking out leadership positions throughout the next two years. This illustrated Harry’s focus and goal-oriented nature in spite of the image that he often portrayed as the class clown.

Harry’s sense of humour came through in his individual reflections throughout his grade 11 year. He was amusing in his written tone when describing an audition: “We were given characters and then we had to create a romantic scene. In my view, it was one kiss short of an Oscar nomination for romance-drama of the year” (Wiki reflection, May, 2012). And he frequently added entertaining lines into his descriptions of events: “This year, the choir travelled to Kingston, Ottawa, and Montreal. This was a great trip filled with music and pizza” (Wiki reflection, May, 2012).

Harry maintained his sense of positivity on the collaborative areas of the wiki and also his sense of fun by creating a funny nickname for himself, “HarryBear,” that he used as his signature at the end of his comments. He demonstrated his sense of humour while giving solid
musical feedback to the group through his collaborative comments, such as: “Happy is fun, sad is not…let’s not wallow! Internal metronome!” referring to a song that he felt needed a more energized delivery through attention to phrasing and forward motion (Wiki reflection, September, 2012).

Harry sometimes used humour in his reflections in a self-deprecating manner and often when related to an area that he was less comfortable with or experienced self-doubt with such as dance. This use of self-deprecation to make light of mistakes or performance issues was noted as a display of social presence in Nippard and Murphy’s study in web-based secondary school classrooms (2007). Harry rarely used self-deprecation in his public posts, but he did use it several times in private reflections. He described his dance audition for the school musical in this way:

Dance was the most difficult component of the audition process for me. Although I can keep a rhythm and I have no problem remembering moves, when it came time for me to present a dance solo in front of everyone else, I choked. Ultimately, my solo showcased no more than my inability to dance.

- Wiki reflection, April, 2012

This comedic and class clown role that Harry chose to portray frequently in class, particularly in his grade 11 year, was a strong personality trait for him that made up a large part of his identity. This changed during his grade 12 year, as he became more focused on his singing and performing and less concerned that others saw him as funny. He seemed to become more confident in himself as a singer throughout his grade 12 year.

This change in musical identity that he chose to portray during the two years of the study was also reflected in the photos that he chose to post on the wiki. During his grade 11 year, he posted several photos showing him as the center of attention with friends, giving him a fun and social image. In contrast, at the start of his grade 12 year, he chose to post his individual photo
from the school musical program: a professional close-up headshot that portrays him smiling confidently.

In his individual reflections, Harry focused more on informal music-making experiences, such as improvising harmonies, and music-making with friends and family as a meaningful part of his musical identity development. The notion of family as a context for musical identity development has been explored in previous studies (Cleaver, 2009; Dawe, 2012). In Harry’s case, he first identified songwriting as a new and positive musical experience and then he made the link to the enjoyment of the musical process being related to working with his brother:

_I had a lot of fun recording this song because considering it was my own song, I could do whatever I wanted with it. This meant that I was able to add harmonies from scratch by rote and on the fly. Overall, I enjoyed the song-writing experience, and writing it with my brother was an added bonus that meant a lot to me._

- Wiki reflection, April, 2012

Harry also reflected on performing a solo at a school assembly as being particularly meaningful since he was singing with his best friend accompanying him on piano:

_This was the first time I had ever performed a solo song for any school event, and according to teachers and students post-assembly, it went well. This was a lot of fun and a personal milestone for me because I got to perform with my best friend._

- Wiki reflection, May, 2012

Harry’s deliberate use of words and phrases such as “enjoyed,” “meant a lot to me,” “fun” and “personal milestone” serve to emphasize the importance of these musical experiences with others as meaningful parts of his personal musical identity.

**Harry’s Collaborative Learning**

Harry was an active participant in the collaborative areas of the vocal class wiki in both his grade 11 and grade 12 years. He was aware of his strengths and weaknesses as an individual singer from the outset, but his reflections demonstrated a progression of becoming more aware of
how others supported him and his role within the larger ensemble. He began to show this awareness through specific comments on how he may have made an error in performance, but that another student supported him: “I forgot to do the echoes at the end, but Charlie did a good job of listening and adapting to my mistakes” (Wiki reflection, May, 2012).

A central principle of collaborative learning is positive interdependence among learners. This phenomenon occurs when one student’s accomplishment impacts the chances of other students’ successes in a positive manner (Abrami et al., 1995). In the context of this study, positive interdependence among the vocal class members was an important factor because each individual singer’s success influenced the overall success of the vocal ensemble. Characteristics of promotive interaction by individual learners include: providing effective assistance to other learners, being motivated to strive for mutual benefit, influencing each other’s efforts to achieve the group’s goals and providing other learners with feedback in order to improve their overall performances (Johnson & Johnson, 2009).

Harry reflected on several aspects of positive interdependence through an individual written reflection where he described his participation in a small ensemble recording project at a professional recording studio. He makes reference to peer critiquing and being motivated to strive for the group goal - an effective song recording - through interaction with other singers:

*I learned a lot from this day, mainly about the recording process in general as it was my first time in a studio, but also about myself as a singer. I learned how to really put all I have into a song, and make it sound as full as possible. On top of this, I got the opportunity to critique my peers on their verses, which also allowed me to keep more of the emotion in mind when singing a song, as opposed to just notes and vocal technique.*

- Wiki reflection, June, 2012

Further along, during his grade 12 year, Harry began to make more specific and action-oriented comments on the vocal wiki ensemble pages that identified musical problems and also provided
possible solutions through musical suggestions. He became more focused in the feedback that he was providing to his peers in an attempt to improve their overall performance:

Also, personally, just because there are only 3 of us guys singing the one guy solo part, it sounds really bad and quiet because we just can’t measure up to the volume from the whole ensemble. My suggestion is that we add maybe 3 girls to it as well (maybe 2 altos and a soprano) so that there are six of us as opposed to just three. Just sayin’! This would also create better blend. More dynamics - as usual - would make it more interesting and sound better.

- Wiki reflection, October, 2012

Along with proposing a solution (adding more voices to the solo section), Harry offered musical feedback on the suggested solution by pointing out that adding more voices would also create better balance and blend. He demonstrated growth in identifying both the issue that he heard through the recording of the vocal class and also by offering strong musical suggestions for improvement. The ability to take on the role of critic by evaluating the artistic work of others was noted as evidence for assessing reflective growth by the Harvard Project Zero and Arts PROPEL researchers (Winner, 1991).

Harry demonstrated both the ability and inclination to use constructive criticisms and suggestions in wiki discussions. He was not afraid to give specific critical feedback to other vocal sections that he was not a part of: “Sopranos need to calm down, probably just because of proximity to sound recorder, and sing with less force, make it gentler!” (Wiki reflection, November, 2012). This is a fairly direct comment that others might not have been comfortable posting, but Harry was confident knowing that his peers would not be offended because of his likeability as class clown and his leadership within the class, particularly during his grade 12 year.

Harry had the opportunity to participate in the focus group session and to reflect on his participation in the collaborative area of the vocal wiki. His comments made reference to
thinking more like a conductor than as an individual singer since he referred to the vocal
ensemble rather than just the song that he was hearing and gave specific feedback regarding the
overall ensemble balance:

*I think for the ensemble pieces, it was more of like understanding how a group or team
works when singing a song. I remember there was one comment that I made, I forget
exactly what song it was, like the sopranos were singing way too loud at this part where
it should be the altos coming out at this part. So, you understand [through listening] how
the group presents itself as opposed to just specific things about a song.*

- Focus group interview, June, 2013

Through both his feedback to peers and individual reflections, Harry demonstrated the ability to
explore different points of view through taking on the perspectives of others. Johnson and
Johnson (2009) include the ability to take the perspectives of others more accurately as another
aspect of promotive interaction in collaborative learning. Through data analysis and
consideration of reflective musical growth, I did not find that this aspect of promotive interaction
appeared as frequently in others in student reflections and posts. I did note that this was a
collaborative learning characteristic that was displayed much more frequently in the repeated
exposure group, of which Harry was a part, than in other iteration groups.

**Harry’s Self-Reflective and Metacognitive Engagement**

In order to better understand Harry’s self-reflective growth and metacognitive
engagement throughout two iteration cycles, I have first examined his reflective learning
throughout his grade 11 year followed by his goal setting and reflective learning analysis during
his grade 12 year. This best illustrates where Harry began with his self-reflection and
metacognitive engagement and where he had developed by the second iteration.

With his strong musical skills and years of vocal experience, Harry was a focused
musician who was capable of commenting on direct areas of improvement, including vocal
technique, in his grade 11 year. He reflected on a solo recording that he was to be performing at
music night with precise comments such as: “A more forward sound would be better as it would
make the vowel a bit brighter and also help with pitch [intonation]” (Wiki reflection, May, 2012). This is the type of comment that a vocal teacher would make to a student singer in a
vocal lesson. It is commendable that Harry can pinpoint his vocal technique issues quite
accurately by his grade 11 year. Through individual reflection, Harry also offered practical
solutions and areas of improvement to his own vocal technique: “More breath support on the
lower and longer notes for more consistent vibrato” (Wiki reflection, May, 2012). His level of
self-judgment was high in that he was aware of where he needed to practice and could identify
his errors within the ensemble: “I personally need to work on the echo part as my pitches were
all wrong” (Wiki reflection, April, 2012). Harry was a strong singer within the vocal class and
one of only five boys and so it was not difficult for him to hear his own voice within the
ensemble. Additionally, he possessed the confidence to express and reflect on his own
weaknesses and readily admitted (in face-to-face classes as well) to his own musical errors in
order to improve the class performance.

Additionally, Harry was able to reflect on higher level artistic decisions regarding the
music in the ensemble progress pages including concepts such as phrasing and energy: “More
dynamics at the right moments to make the performance more interesting. This will add to the
dramatic aspect of the song lyrics” (Wiki reflection, October, 2012). Harry also exuded
confidence in his collaborative comments, giving advice and suggestions for his peers to
consider, as he frequently took on the role of leader: “I think that maybe a bit faster tempo
would sound better and it would help with energy... something to think about” (Wiki reflection,
November, 2012). He consistently demonstrated that he was not afraid to disagree with or offer alternatives to the artistic choices of others, including the teacher/conductor.

By the end of his grade 11 year, Harry demonstrated the ability to reflect on his musical learning through new performance experiences such as singing with a rock band:

Being able to perform with the band three times in one term was definitely an exciting and memorable experience. Each time, I grew as a performer. Learning how to “let loose” on stage with the band and really connect with the audiences was a challenge, but I also got to learn from this and will be able to take the performing skills that I did acquire with me whenever and wherever I perform in the future.
- Wiki reflection, April, 2012

Although he articulated that he was challenged to learn how to “let loose” and connect with audiences, he did not articulate exactly how he overcame this challenge except perhaps through more frequent performances in a different medium (rock band) than he was accustomed to due to his more formal musical experiences in musical theatre and choirs. Harry demonstrated a high level of adaptive responses (Zimmerman, 2000) in many of his self-reactive comments where he would discuss a musical or personal challenge in terms of a growth opportunity rather than an insurmountable hurdle.

In terms of vocal technique improvements, by the end of the first iteration and Harry’s grade 11 year, he was able to examine past vocal issues, such as his perceived inability to sing falsetto due to a case of severe laryngitis, and to overcome them through practice:

This song really challenged my vocal range, and the last note was possibly the highest I’ve ever had to sing for an audience. Ever since I had laryngitis in grade 9, I haven’t been able to sing falsetto. I have tried different warm-ups but nothing has worked. I’m not sure why I haven’t been able to, but I not being able to posed a real challenge during the song. The last note was written very high, and it is also the melody. In fact, it is so high that every time I’ve heard it performed, the singer has done it in falsetto. Considering I couldn’t, I had to really practice hard in order to hit the note without going falsetto, and this challenged my range. From this experience however, I found that with enough practice, I could hit notes that I never thought I could hit, and I can take this lesson and use it to widen my possible vocal repertoire in the future.
- Wiki reflection, April, 2012
Again, Harry was not able to analyze exactly what allowed his range to expand in terms of vocal technique, he credits this success to “really practicing hard,” but he did reflect on his own growth and learning from a specific incident in his musical life. He was able to articulate a musical problem (a vocal range issue), formulate a plan, track his musical progress, and practice effectively in order to achieve his musical goal; all of which are part of Zimmerman’s (2000) SRL process. At this point, Harry seems to be moving from practicing more as a reaction to immediate problems encountered in the music (such as an incorrect rhythm) to beginning to adopt a more holistic approach to his practicing and musical development (Lehmann & Davidson, 2006; Lehmann, 1997).

The second iteration of the vocal wiki coincided with the beginning of Harry’s grade 12 year. At this point in his vocal education, he chose to title and name his three main goals reflecting both his energetic personality and his increased focus as a singer. He titled his goals as follows: “What’s goin’ on here!” represented his goal of better knowing the songs that he was singing in terms of stories, characters, settings, motifs and themes; “Time to hit the books…” outlined his goal of increasing his music theory understanding; and “What’s that I hear?” referred to his goal to improve his overall musicianship skills such as ear training, sight singing and aural skills. This act of naming his three musical goals and going into depth about how he planned to achieve his goals reflected a strong level of self-regulated learning in the first planning phase as per Zimmerman’s model (2000).

In his second iteration progress reflection, Harry was hard on himself in terms of his goal achievements: “According to the goals I set in September, I have not progressed at all” (Wiki reflection, December, 2012). He reflected on why he feels that he has not progressed: “My second goal… to be honest, I haven’t even attempted to accomplish this as we haven’t done as
much theory in class and I have been devoting most of my time to performance” (Wiki reflection, December, 2012). But Harry articulated how he could work to get back on track with this goal: “That being said, I have a great opportunity to challenge myself in this realm for my vocal exam” (Wiki reflection, December, 2012), again demonstrating his ability to react with an adaptive response to his self-evaluation.

Harry continued to develop into a more critical reflective learner who was able to realistically reflect on his own goals: “My third goal is going to be the hardest for me to accomplish. However, I find that my ear training and sight singing has been improving from performing with the choir” (Wiki reflection, September, 2012). At this point in his grade 12 year, he also identified how he might achieve some of his goals in different ways than he considered even a few months earlier, such as through informal music learning:

> Although I have yet to invest significant time in this area, theory is something that I would like to improve. I have (kind of) started to learn guitar and I think I can carry a lot of my theory learnt from vocal to my guitar studies.
> - Wiki reflection, September, 2012

Instead of expressing negativity or lack of motivation because he had not achieved all of his goals at the time of his progress reflection, Harry chose to continue to develop and add to his goals. These additions to his personal musical goals, due to inspiring musical events that occurred since he set his initial goals at the beginning of the year, demonstrated that Harry was actively developing his self-regulated learning skills in a cyclical manner. This included Harry’s constant reflecting on his own learning and continuing to challenge himself as he advanced musically through new experiences:

> For reporting periods two and three, I would like to add a goal to my checklist; and, this is to explore other styles of music. So far, I love sing “Caro mio ben” as I truly get to lengthen and play with my vowels. I would further like to explore Italian art songs in the following terms [winter and spring].
> - Wiki reflection, December, 2012
Harry reflected on the process of self-reflection and goal setting through the wiki in his focus group discussion noting that the very process made him more aware of his musical goals:

*I found that it [wiki reflection] kind of made me re-establish my individual goals because I feel like when we had to make the self-evaluation, the goals, I considered that more of like a homework thing, like Oh I just want to get it out of the way but then doing a reflection, on the wiki, it made me re-think my goals. Because I remember one of my goals was that I want to become great at theory.... No, I don’t! [Laughter]*

- Focus group interview, June, 2013

Harry also reflected on the recording process where he was asked to record the solo of his work-in-progress and how this affected his motivation to practice in a positive way. In the next focus group discussion quotation, Harry relates pitch and rhythm musical errors to spelling errors in essays demonstrating his ability to connect ideas between subject areas. Harry’s comments also refer to the cyclical nature of self-reflection and self-regulated learning processes:

*Because when you playback something and it sounds bad, well I don’t want to send that to you. Like here’s my final project! It’s kind of like seeing a spelling error in a major paper and not fixing it and sending it to your teacher, you want to fix it [the musical error] so you’re just like ok take two, you know, and then you start it again and re-record it. You are trying for perfection, so you practice more.*

- Focus group interview, June, 2013

The idea of perfection or the goal of achieving the perfect recording was discussed in the focus group sessions as well as referred to in many individual student reflections. This issue was also reflected on in the teacher/researcher journal since the recording processes were never given the directive of being “perfect” but rather works-in-progress at both the ensemble and solo levels.

Harry’s focus group comments supported the idea that students can improve, without explicit teacher direction, in the area of vocal technique through the recording and reflection process. Harry’s reflections on this cycle of recording, critically reflecting, and then making adjustments before recording again are similar to Lebler’s (2007) findings with his scaffolded,
self-directed learning community outlined in the second chapter. Harry illustrated this process of recording and reflecting in his focus group comments:

*Let’s say in the practice room, when I was recording “For Good” or something and I’d record it once and I’d hear like, oh I went flat at that one part, so I’d try to raise my cheekbones and maybe like use better posture or whatever. Like those techniques, the recording and then thinking, helps to develop them.*

- Focus group interview, June, 2013

Harry’s comments supported both the notion of self-reflection as a cognitive process as well as the idea that consistent reflection on practice can lead to development for learners (Brown, 2002; Dewey, 1933; Schön, 1983).

**Ashley: Happiest when Singing**

Ashley joined the vocal music class when she first came to the school in her grade 9 year. She was a grade 10 student during the first iteration of the wiki and a grade 11 student during the second study iteration. Like Harry, Ashley was a part of the “repeated exposure” group since she had exposure to the vocal wiki through two iterations. Ashley was a relatively quiet young person but, in her own words, really “came alive” in music class. Ashley felt that singing was her major passion both in her academic life and outside of the vocal music classroom. Like most of the vocal music students including Harry, Ashley was very involved in the choral program at the school as well as the school musicals. Unlike Harry, she did not always have the lead roles but enjoyed her time singing and acting.

**Ashley’s Musical Identity**

Like Harry, Ashley tended to emphasize formal music training in her vocal biography listing a variety of achievements and involvements. She did not identify herself as fitting into
one voice part as most students chose to do. Instead, she mentioned that she “typically sings alto but is comfortable singing in the soprano range as well” (Wiki reflection, April, 2012) which reflected her flexibility and desire to be involved in many capacities as a singer. Ashley expressed her enthusiasm and love of singing through her vocal biography: “From a young age, Ashley has had a passion for vocal music and has been involved in vocal music for most of her life” (Wiki reflection, April, 2012). She also chose to highlight her friendliness and helpful nature in her biography: “She is always eager to help out wherever singers are needed” and “Ashley is happy to share her love of the arts and pass it on” (Wiki reflection, April, 2012). Ashley incorporated references to the future in her biography by including music as a possible career choice, perhaps to underscore the importance of vocal music in her life and personal identity:

In the future, Ashley will not lose her connection to the vocal music world. It is such a large part of her life she plans never to forget it and she will let life take her where she is supposed to be and if that happens to be a career in vocal then she will be ready to take that on.

- Wiki reflection, April, 2012

In the second iteration of the study, Ashley’s grade 11 year, she kept the positive tone to her vocal biography, but adapted it to make it more professional and concise overall. She also expanded her vocal range to identify that she currently sings alto, but is “confident singing up to soprano one range” (Wiki reflection, September, 2012). This statement is worded in a more professional tone than her earlier identification of her vocal range and voice type in her grade 10 vocal biography.

Ashley did not post a photo during the first iteration of the wiki, most likely because it was not a part of the requirements during that iteration. She posted two photos, both of her, during the second iteration on her public page. The first photo, appearing before the biography,
shows Ashley in a nature setting smiling confidently at the camera and the second photo, appearing after the biography, depicts Ashley in her bedroom playing the guitar. In the second photo, she is hunched over the guitar with her hair falling over her face so that her expression cannot be seen and the focus of the photo is more on Ashley’s hands as they strum the guitar. Ashley seemed to choose two photos that depict different aspects of her musical identity: confidence and poise in the first photo in contrast with a more individual and personal depiction in the second photo.

Ashley’s open and friendly personality that she expressed through her vocal biography also came through in her collaborative posts on the wiki. Ashley scored very high in her use of social cues on the wiki especially in the areas of compliments to others and use of symbolic icons. Both the use of symbolic icons or emoticons to express emotion and the act of complimenting peers have been categorized as displays of social presence in web-based contexts (Nippard & Murphy, 2007). Ashley came across as very friendly on the wiki particularly during her grade 10 year where she signed all of her collaborative posts with hearts: “This is sounding so pretty! Great work ladies! <3 Ashley :)” (Wiki post, April, 2012) in reference to a song that only the girls in the class were singing. Ashley was able to give constructive criticism to others in the class, but it was often very general and had more of a pep talk tone to it than actual specific suggestions on how to improve:

You're all talented singers and we have improved on this song but we have a lot more work to do if it is to be ready for Thursday. The harmony sounded pretty good before but I think we may have had an off day. I'm a little worried about this piece but I'm sure we can improve in our next couple classes.
- Wiki post, April, 2012

Further, Ashley often ended constructive or critical comments with compliments and encouragement to her peers: “WE HAVE SO MUCH POTENTIAL. You're all amazing singers!
I'm sure it was just an off day! <3 Keep on singing! <3, Ashley” (Wiki post, May, 2012). She always included herself in any criticism and she usually built very effectively on her own previous posts and the posts of others in the class: “I knew you could do it guys! It was absolutely an off day before. This sounded so much better. Cindy and I need to be careful to not go high on the last line, as we are still a little wary of that” (Wiki post, May, 2012).

**Ashley’s Collaborative Learning**

Towards the end of the first iteration, Ashley was becoming more specific with her ensemble repertoire discussion posts as well as continuing to build on the comments of others to create discussion on the wiki:

*First off, I'm really impressed with the work our class is putting into this song and with some more practice it's going to sound great. I agree our class is fairly solid on the beginning. Our altos and sopranos need to spend some time cleaning up the end because we do have some difficulty there and with some work it will sound better. Katie, I did catch that in the echo section for a moment however I think it was a minor slip up and it can be fixed, of course. A few quick things - watch where you breathe and don't hold back on your singing. Overall, I see so much potential in this song. We have really strong singers in this class and strong sections in this piece. Keep practicing! :) ♥, Ashley - Wiki post, May, 2012

Ashley was very genuine in what she expressed in the collaborative discussion areas because she tended to reflect similar themes and frustrations with her peers in her individual reflections. She was not yet demonstrating the ability to hear and identify specific ensemble errors, but she correctly recognized that the ensemble was not advancing quickly because some of her peers in the Upper vocal class were new to singing and were holding back slightly:

*We have very strong singers capable of great things and they just need to take a leap of faith and sing out and we can have a great sound. Everyone sang correctly, however I feel we did have some people holding back.*

- Wiki reflection, May, 2012
This holding back is most commonly due to lack of confidence and, therefore, Ashley’s encouraging, positive and supportive tone throughout the collaborative area of the vocal wiki was presumably quite appreciated by her peers, especially those who were new to the vocal class and lacked the experience that she had. She consistently demonstrated strong ability to provide effective assistance and support to her peers, a central characteristic of promotive interactions (Johnson & Johnson, 2009).

Ashley participated in the focus group discussion after the first iteration wiki and discussed the delivery of peer and ensemble criticism in the collaborative wiki areas:

Ashley: *Maybe it was a bit more sugar coated….because like you don’t want to be mean because you know these people*....

Lily: *You have to see them the next day!*

Ashley: *Right, so people maybe held back a bit in their comments or try to give corrections in a nicer way.*

- Focus group interview, June, 2012

Perhaps by recognizing that she was being quite positive on the wiki helped Ashley to be more direct while still remaining encouraging during the second iteration, her grade 11 year. During this time, she did not demonstrate the need to couch her critical views and peer feedback in compliments. She began to focus more on providing feedback to her peers with the overall goal of improving the vocal ensemble. Her comments definitely changed in tone during the second iteration. She was able to be much more critical, while still being constructive, through more specific suggestions and improvements for the ensemble. Ashley also stopped signing her full name to posts and, instead, used just her initials and no longer used symbolic icons in the second iteration posts:
We have made a lot of improvement on this song. It still needs a little work, especially when we switch to “la” instead of “do”. Work a little more on where we breathe and otherwise just keep singing in order to be totally solid on your own part. (A.K.)

- Wiki post, October, 2012

Ashley still remained positive during the second iteration and wrote a few of her popular encouraging comments: “Keep working, we can do a really good job on this song, I know it!” (Wiki post, November, 2012). Ashley viewed relationships with her peers as a major focus of her music-making. She recognized the importance of friendships within the vocal class as well as the need to belong and to be a part of something larger than herself through the class ensemble. Not only did she reflect this in her positive presence in the wiki discussions, but she also echoed this idea in her individual reflections such as this example of a grade 12 reflection that she titled: “What We Did For Love (on Cabaret Night).” Her title was a play on words on the title of the piece that we were performing called “What I Did For Love” and she went onto reflect about her passion for singing and for being a part of the class ensemble:

* Cabaret was very special because it was a showcase of just how much we all did for love, that being the love of vocal. It was a time to show the work we’d done and how much we enjoyed singing these songs, even if this was the last time we’d sing them together. 

- Wiki reflection, November, 2012

Ashley’s personal joy that she described from ensemble singing and performing remained a strong part of her personal musical identity that shaped her engagement in all aspects of the vocal wiki including the area of collaborative learning.

**Ashley’s Self-Reflective and Metacognitive Engagement**

Ashley’s self-reflective and metacognitive engagement can be observed through two iteration cycles. Her reflective learning can first be analyzed from her grade 10 year; followed by her reflective learning and metacognitive engagement through her grade 11 year, during the second study iteration. As in the first case study, this linear look at Ashley’s reflective process
as chronicled in the vocal wiki should best exemplify her reflective musical journey and
demonstrate her metacognitive development.

In her grade 10 year, Ashley’s vocal goals were general and unspecific in terms of how
she might achieve them: “I am aiming to improve my voice quality in any way I can this year”
(Wiki reflection, March, 2012). Her only specific goal was to improve her music theory skills,
but again, she did not detail how she would do this in terms of concrete plans. There were no
additional specific references to vocal technique or to other performance related goals. Ashley’s
goals had a very exploratory tone to them, almost as if she was not sure how to set specific goals:
“Overall, would simply like to explore my voice type this year and expand on my current skills
in order to improve my vocal quality” (Wiki reflection, March, 2012). She used very general
musical language in that goal articulation and did not articulate which of her current skills she
would be working on and which aspects of her vocal quality she wished to improve. During the
first iteration, Ashley’s goals were at a beginner level in terms of scope, realism, and her ability
to articulate her thoughts about her own learning.

Ashley’s individual reflections, during her grade 10 year, mostly outlined new musical
experiences and focused on her vocal growth and progress over time. She reflected on new
experiences that supported her vocal growth and seemed to be learning and reflecting at a rapid
rate as she attempted to make sense of these new experiences:

This year was a year of growth for me vocally. I had so many new experiences, such as
the vocal trip to Montreal, experiencing genres of music I had not looked into before and
more. One of the experiences I found most of my vocal growth in this year is the chance
to have more solos.

- Wiki reflection, May, 2012
Ashley frequently mentioned challenging herself and taking risks in her individual reflections. Along with new experiences as challenges and risks, she also discussed how she embraced opportunities that she had previously not achieved or had not been given the chance to try:

*I have been focusing on technique and moving out of my comfort zone this year and it has been very beneficial as a singer. This year I sang solos in “Down to the River to Pray,” which I auditioned for the year before and did not get.*

- Wiki reflection, May, 2012

These reflections highlight Ashley’s determined spirit and her desire to keep learning and growing as a vocalist. Another theme present throughout Ashley’s individual reflections is self-confidence and growth: “This performance gave me the confidence to audition for the Chamber Choir next year” (Wiki reflection, June, 2012). Ashley’s positive nature was expressed in her reflections where she referred to a goal that she did not meet; she was very realistic in her analysis that she could still attain this goal in the future: “I just did not focus on that goal this year, that does not mean I failed and it does not mean I cannot learn it still” (Wiki reflection, June, 2012). Like Harry, she tends to respond adaptively to goals that she did not meet demonstrating her development of positive self-reaction (Abrami et al., 2011).

Ashley’s individual reflections also demonstrate her developing self-reflective skills in that she can be self-critical as a music learner: “I need to work on some entrances, just getting the notes and rhythms. I also need to work on when it [the song] changes to the la's because that tends to throw me off!” (Wiki reflection, October, 2012). In the same reflection, she credits the wiki process of listening and reflecting on ensemble recordings as a valuable tool to her development as a singer. She mentions that she listened to the recordings both in class, which was done at first to acclimatize students to the listening process, as well as outside of class referring to practice at home: “Listening to recordings in- and out-of-class helped me to be
aware of where I do well in songs, what my strengths are and where we need improvement. They were very helpful” (Wiki reflection, October, 2012).

For Ashley, the change from Upper to Senior vocal class brought with it a new maturity and focus in terms of her reflective thinking. Her goals at the beginning of her grade 11 year, the second wiki iteration, were much more focused, specific and varied. The contrast between her self-reflective work in grade 10 and in grade 11 was very evident. Her goals were well organized and divided under three headings: “Piano/Guitar, Range, and Genres.” Overall, her goals were well articulated, realistic, and mature. She also included specific plans of how she would achieve each goal over the year, for example, with her goal of increasing her vocal range:

"I still want to keep working to achieve a bigger range mainly working at improving the top and bottom of my current range. I will do this by continuing to sing as much as I do and singing all the vocal parts I am assigned to from alto two to soprano one. This will really push me to sing often in all areas of my voice.

- Wiki reflection, September, 2012

The evidence of growth in Ashley’s self-reflective thinking supports Dewey’s notion that reflective learning is a cognitive skills requiring practice and instruction in order to develop (1933). Through opportunities to practice over the first iteration cycle, Ashley’s reflective learning skills showed strong development.

During the second iteration, Ashley made references, for the first time, to informal music making in her vocal goals referring to her desire to learn the guitar: “This year I would like to improve the skills I already possess in terms of piano and learn how to properly play the guitar, as I am currently self-taught” (Wiki reflection, September, 2012). In her grade 11 reflections, Ashley began to articulate her own musical opinions and what she felt were important aspects of musicianship and how these relate to her singing experience: “As a musician, I find it very important to explore beyond your main chosen instrument. In my case, I’ve chosen to focus on
vocal but that does not mean I cannot try other instruments such as piano and guitar. I’d like to improve on both these instruments so that I can play for myself when I perform” (Wiki reflection, September, 2012). According to Zimmerman’s SRL model, Ashley is developing her self-regulated learning in the first phase of the process including her self-efficacy and goal orientation (2000). As her confidence and self-efficacy as a singer increase, her goals become more organized, well planned, and more specific to her personal musical choices.

Ashley was a part of the trio of students, detailed in Chapter 4, who chose to record their solo recordings in a small ensemble. She reflected on this process in a focus group interview noting that recording in a small group, as opposed to in isolation, allowed her to better understand how her own part fit into the overall song:

*I think also when you are recording by yourself, you are focusing more on your own part but I think that it would be important if you did it in groups of three where everyone sings a different vocal part because you want to see how it fits together and make sure that you can stay on your own part. It was a lot more helpful, I think, comparing it to when you work alone...like obviously you need to work alone before but when we brought it together it really helped.*

- Focus group interview, June, 2013

Through these comments, Ashley makes reference to another collaborative learning principle that involves highlighting individual learner accountability so that each student is responsible both for their own learning and for helping other group members to learn (Johnson & Johnson, 2009). Ashley made specific reference to working in small ensemble groups where learners each sing a different vocal part, as opposed to working in sectional groups with the same voices parts, as a key structure to collaborative work. This differentiation of having singers of different voice parts working in small ensembles is key to the learner accountability principle since singers would have to be confident in their own part in order to contribute to the group’s overall success.
Ashley also discussed the inevitability of making mistakes on vocal recordings and how instead of re-recording and striving for perfection in her recordings, she chose to learn from her musical mistakes:

But for me... When I made a mistake, I just said “Oh I made a mistake” and then started again from the same part. I think that it’s actually good to keep the mistake in there [the recording] so that we know where it is because it’s usually some place where you are actually having trouble so I think that having the perfect recording is kind of silly.

- Focus group interview, June, 2013

Ashley has recognized that learning from and reflecting on errors is more helpful to her musical development than having a perfect recording without errors. She is likely able to come to this realization through her strong intrinsic motivation to improve as a singer as well as her consistently adaptive responses to errors and issues in her music-making processes. Through both of these reflections, Ashley is making metacognitive connections between her musical practices and her learning development, both as an individual singer and as an ensemble singer working within a small group context.

Ashley’s final progress reflection was an honest and realistic reflection on her goal achievement. By the end of the second iteration, she was at the point in her metacognitive development where she realized that her musical goals were not necessarily completed simply because the school term was ending, but that they continued beyond the course and she began to make connections to lifelong musical learning in her reflection. She also reflected realistically on goals that she perhaps did not get as far as she would have liked to, realizing that she could continue to work on them:

Finally, my goal to improve piano and guitar skills has made small improvements, however, there has not been very much time available to focus on it. Over December break I hope to continue my exploration and improvement for this goal.

- Wiki reflection, December, 2012
Finally, Ashley discussed the idea of setting new goals and came to the realization that she wanted to continue to add new goals as she continued to expand her musical interests: “There is so much that I want to learn now! I want to keep working at these goals and work to make and accomplish new vocal goals in the coming years” (Wiki reflection, December, 2012). Her comments demonstrated that she was becoming proficient at aspects of self-regulated learning, including self-reflection, and that she was beginning to conceptualize self-regulated learning as a cycle that would continue beyond this academic year and academic course.

**Kim: New to Singing**

Kim was new to the school in her grade 10 year and joined the vocal class at that time. Kim met with me early in the school year because she was nervous about being a part of the class due to her lack of musical and vocal experience. Kim was not a strong singer and sang very softly at first, in part due to her lack of experience with vocal technique, and in part, due to her lack of confidence. Outside of singing, Kim was a confident and outgoing person. Kim was a part of the grade 10 vocal class during the second iteration of the vocal wiki. Unlike Harry and Ashley, Kim was not a part of the “repeated exposure” group since she was only a part of the vocal wiki for the second iteration.

**Kim’s Musical Identity**

Unlike more experienced singers Harry and Ashley, Kim began her vocal biography, the first main point of her musical identity expression on the vocal wiki, by listing her age and an informal and rather humorous musical reference: “Kim is 15 years old and she loves singing in the shower” (Wiki reflection, September, 2012). Arguably, the act of singing in the shower is thought of as a habitual musical act that everyone is capable of, not only trained singers. Kim
seemed to state this at the outset of her biography because this assertion immediately informs her peers that she has not had formal training as a vocalist and is new to singing. Right from the beginning of her vocal biography, a central part of her musical identity expression on the vocal wiki, she let other members of the musical community know that she was new to singing in a humorous way.

Further in her vocal biography, Kim chose to include some formal musical references as she outlined her piano playing experience and brief training. She chose not to identify with any specific areas of vocal specialization or focus but she did make references to musical theatre as an area of personal importance during her vocal studies: “Kim doesn't have a specialization with her voice, but she loves to sing musical theatre because it includes acting and singing” (Wiki reflection, September, 2012). Kim also chose to make mention of sports as a strong part of her identity in stating that she “loves to play tennis, volleyball, and soccer” (Wiki reflection, September, 2012). Perhaps she chose to highlight other aspects of her personal identity, outside of her musical identity, because she realized through social interactions that other members of the vocal class were generally more experienced singers.

The photo that Kim chose to post on her individual public page was not a photo of herself but rather of koala bears cuddling together. She portrayed a photo of furry animals that appeared friendly, warm and comforting, perhaps to show a friendly aspect of her personality or perhaps to demonstrate a love for animals; in either case, the resulting emotion was one of warmth. Kim did not post a photo of herself on the wiki at any time, perhaps an indication that she was still forming her musical identity and was not prepared to fully engage in the wiki community through the addition of a personal photo.
Kim came across as friendly and optimistic in the class discussion areas on the vocal wiki due to her use of symbolic icons, such as smiles, as well as her informal language and positive comments from the outset. Kim’s first comment on the ensemble progress page reflected this affirmative tone and informality in addressing her peers: “Guys! I thought it was awesome and we sounded very good together!” (Wiki reflection, October, 2012).

**Kim’s Collaborative Learning**

Kim was an active participant in the collaborative discussion areas of the Upper vocal class wiki during the second study iteration. She engaged in the discussion and reflective dialogue aspects of the ensemble repertoire page by reading and building on the comments of her peers, as opposed to always posting new comments without making reference to the postings of others. She also used musical language effectively and demonstrated the ability to identify musical issues accurately through listening to the ensemble recordings. Kim’s level of participation in the collaborative sections of the vocal wiki was very strong and reflected her solid aural and analytical skills. In spite of her lack of formal vocal training and experience, Kim possessed the ability to listen and accurately analyze vocal issues and areas that needed improvement. While this lack of vocal experience made her nervous in other areas of the vocal class, Kim sounded quite confident and self-assured in dialogue with her peers on the wiki:

*I agree with Isabella, the guys sounded like they were forcing [their voices] a little bit too much. I know they have the part with the most complicated lyrics but still I think it will be better if it can be a little bit softer. Last thing to add, the part that we did starting from bar 52 was off-pitch, it was probably because we really didn't practice it all together, but we need to work on this section still.*

- Wiki reflection, November, 2012

Kim also avoided negativity or resentment of other vocalists by including herself in the criticisms as appropriate: “And in the "mmm" part I didn't hear everyone doing legato with the
notes, some of us were doing it more separated -- including me! We definitely should work on that” (Wiki reflection, November, 2012). Kim does not seem sure of how to fix musical problems, in terms of offering a vocal technique-based solution, but she does refer to practicing as an ensemble, which is helpful. Kim is not always able to offer high level musical feedback to other members of the vocal class but she certainly engages in promotive interaction through her posts and attempts to support and help her peers.

By including herself as part of the ensemble and part of the problem section, Kim chose to attempt to motivate the class through the team aspect of ensemble singing. Kim worded her criticisms in constructive and fairly gentle ways in her vocal wiki posts and kept an encouraging tone throughout. This strategy aligns with promotive interaction in that she is motivating members of her learning community to strive for mutual benefit as well as advocating effort and commitment to achieve ensemble goals (Johnson & Johnson, 2009).

**Kim’s Self-Reflective and Metacognitive Engagement**

Kim’s first engagement with the vocal wiki that involved self-reflective learning skills was through her goal setting reflection. Kim’s goals were specific, realistic, and attainable, and included the desire to increase her higher range because “I have problems with singing the higher notes” (Wiki reflection, September, 2012) as well as her goal of joining activities that have to do with music. Kim’s self-regulated learning skills in the area of planning and goal setting were well developed coming into the vocal course.

Kim’s self-reflective learning grew over the course of the term, but she demonstrated the accurate ability to listen and identify strengths of other singers from the beginning of her written reflections. This is clear in the following reflection that she wrote early in the wiki process based on a performance of a musical theatre show:
Rhonda was one of the main characters in the musical and her vocal ability impressed me. Rhonda was a soprano. Every word that came out of her mouth was crystal clear and she had no issues with pitch, she had excellent intonation. She was very engaging with her high notes, she projected them very well and when she dropped them, they were very soft which was a good thing. She was using her entire body while singing the higher pitches. I realized she was standing tall and straight while singing, she held her posture and stance very well. She used the space in her mouth very efficiently and took the advantage of this while singing the high notes.

- Wiki reflection, October, 2012

Although, Kim did not always use vocal terminology such as identifying the “space in her mouth” as resonant space, she made intuitive observations about this singer in terms of her strong vocal sound and related this to the physicality of her vocal production when she correctly referred to aspects of entire body use and posture.

With beginning vocal students, many teachers might mistakenly equate the lack of formal vocal experience to a lack of any musical skills when this is not necessarily the case. Many aural and analytical musical skills can be developed through informal learning experiences, including improvisational singing and harmonizing as well as engaging with popular singing shows such as *Canadian Idol* that involve listening to a variety of singers and critiquing them. Kim was an excellent example of a student who brought strong informal music skills into the formal music classroom. These skills made up an important part of her musical self and should be recognized and valued. Without opportunities for reflection, Kim’s analytical skills might have been lost in a traditional performance-based class where there are not always opportunities for student-to-student interaction and dialogue or for the development of reflective practices. Kim was more comfortable expanding on her musical thoughts in individual reflective spaces on the vocal wiki and, to a lesser extent, in public areas such as through collaborative discussion. During face-to-face ensemble rehearsals, she rarely contributed musical suggestions or shared her opinions, perhaps because she was new to the vocal class or perhaps because other more confident musical
students would often jump in and take the lead in face-to-face rehearsals. The vocal wiki provided a safe space for expression of musical thoughts and opinions in both public and private contexts. Additionally, the vocal wiki asynchronous design allowed for reflections and posts to be written outside of rehearsals giving students more time to think and reflect before they had to contribute their ideas and allowing for practice in their reflective thinking processes.

Along with Kim’s ability to analyze aspects of vocal production in other singers, she demonstrated that she was also aware of her own developing abilities as a vocalist through wiki reflections: “I was having challenges with hitting the high note in one part but while we were performing I did it” (Wiki reflection, December, 2012). Kim expressed self-doubt and anxiety especially when reflecting on solo singing, which can be one of the main causes of fear for new singers. She reflected on the physical effects of performance anxiety, which are very real in moments of stress:

'I was very nervous about singing my solo to the class because it was going to be my first solo performance. I was shaking in the beginning because I was very stressed about hitting a wrong note. But it actually went well, better than I expected.'
- Wiki reflection, November, 2012

Kim demonstrated the ability to reflect on her physical reaction to singing during her first solo performance, in spite of writing this reflection after the experience had occurred. This is not an easy task since it can be difficult for singers to recall exactly what happened in a performance without hearing a recording or seeing a video. Kim was able to recall that she had an issue during her solo (a voice crack) and that she was able to recover and continue: “At one part I don’t remember why but I cracked, but then I was able to fix it” (Wiki reflection, November, 2012). She also discussed how she planned to continue and to improve from this first solo performance, thus demonstrating a very adaptive response to her fears and experiences:
For the next solo, I will work on my dynamics, high notes and posture. I will also work on the clarity of the words. I think there are a lot of things that I can continue to develop. I will work on them for my next solo and try to achieve a better performance.

- Wiki reflection, November, 2012

Kim was one of the students who went above and beyond in terms of surpassing the expectations in the quantity of her individual reflections in the vocal wiki. She mentioned, in the focus group interview, the importance of having the individual private areas for posting goals and reflections: “I don’t think that I’d be as honest if I knew that everybody could see them [the reflections] as opposed to just you [teacher] and I” (Focus Group Interview, June, 2013). Kim’s assertion of honesty in her reflections is exemplified through statements that she makes about her own learning and how far she has come as a singer: “I think I developed my technique with breathing and posture too. I had no idea what those elements were in the beginning of the year, now I know a lot about them” (Wiki reflection, December, 2012). Additionally, Kim’s reflections contained references to the theme of confidence and how she developed this through her singing: “I wasn't confident with my singing in the beginning of the year but now I feel more confident because I performed my solo and that also built up my confidence” (Wiki reflection, November, 2012). This demonstration of self-efficacy in Kim’s reflections exemplifies her self-reflective growth. By the end of the second iteration, Kim was able to identify why and how she improved as a vocalist through her reflections. She was also consistently using vocal terminology in her analysis:

Correct posture and technique really make you look more confident and helps your singing. I can carry a note much longer than I used to be able to, probably because we have vocal classes three times a week. With practice, my breath support is getting better. I can also sing notes that I couldn't sing before with the help of my posture and breathing techniques.

- Wiki reflection, November, 2012
Finally, like Ashley, Kim reflected on the idea of working with a team and being part of an ensemble as important to her development and sense of belonging in the music classroom. She expressed the comfort in being a part of a vocal ensemble where singers feel supported by their peers:

*I felt very confident when we were singing because it wasn't a solo and if I made a mistake someone could have covered it for me, which was a big relief. I think as a class we all have beautiful voices.*

- Wiki reflection, December, 2012

Through this reflection, Kim makes reference to trust, specifically trusting others in the vocal ensemble, which is another key component of promotive interaction and collaborative learning (Johnson & Johnson, 2009). She doesn’t specifically use the word “trust” but her statement about others being able to cover her mistakes, if needed, reflects this idea. Along with being a cooperative learning principle, trust among ensemble members has been explored as an integral part of singing in vocal ensembles, choirs, and other musical ensembles (Countryman, 2010; Freer, 2007).

**The Development of Musical Identity and Reflection: Interpretations from the Case Studies**

**Student Musical Identity**

There were many depictions of student musical identity through written word, images, and recordings on the vocal wikis through both study iterations. Students had opportunities to portray and express themselves within the vocal class community through their vocal biographies and photos, the recordings that they chose to post, as well as their interactions with peers in discussion areas. Students varied in their choices to share informal or personal music-making experiences with their peers or to keep the focus of their online musical identities on their formal
music-making experiences that primarily occurred in the school context. The self-selected photos were also a way in which students could shape their online musical identities. In some cases, students did not post a photo of themselves on the wiki, but chose instead to post a photo of an animal or a group of friends. Musical identity expression and development include both what was posted online and what students chose not to include as part of their online musical identities.

Like other aspects of growth and development, student musical identity did not remain static, but was constantly being shaped and expressed by the students through reflections, discussion, and additions to the vocal wikis as they embarked on a variety of new musical experiences throughout the iterations. In many cases, the experiences that were shared included both their formal music studies at school as well as their informal music learning occurring primarily outside of the school context.

All three students identified the importance of relationships in their personal music-making as well as the importance of belonging to a vocal ensemble and being part of this community. They all mentioned the idea of working with a team and being part of an ensemble as important to their development and sense of belonging in the music ensemble through peer support. This supports the work of Cleaver (2009) who examined the role of family in identity construction and Hoffman’s (2008) study on the construction of adolescent sense of self within the middle school music classroom. Additionally, the process of reflection has encouraged self-expression and musical identity development in various contexts including music classrooms (Morrison, 2004, 2010; Reid, 2002; Rickards et al., 2008).
**Student Collaborative Learning**

All of the case study students participated actively in the collaborative discussion areas of the vocal wikis, yet the three took on different roles in the musical dialogue. Harry quickly moved from his humourous class clown role to that of leader within the class in the online discussion. His peer feedback was consistently constructive and he demonstrated the ability not only to identify musical problems, but to offer pedagogically sound musical solutions for the issues that he observed. At first, Ashley was extremely positive and friendly, almost seeming hesitant to say anything negative in the ensemble discussion areas unless it was surrounded by upbeat comments and positive emoticons. Ashley eventually grew more direct and constructive in her dialogue posts during the second study iteration. Kim’s comments were friendly yet direct and constructive in her tone and contributions. Both Ashley and Kim demonstrated the ability to identify the musical issues, but were not able to consistently offer musical solutions through applications of vocal or choral techniques. Ashley did show strong improvements and developments in this area during the second study iteration in her posts. Kim did not have the opportunity to be a part of a second iteration cycle during this study and so it is not known if she would have developed this ability over time but it seems a likely possibility. From the class posts, it appears that most of students can identify musical problems, but it’s the next step of offering solutions based in vocal pedagogy that can be challenging and represents the next level of growth in their individual reflective learning.

Overall, the three case study students showed many examples of promotive interaction in their discussion, reflections and focus group comments such as helping their peers, motivating each other in the vocal ensemble, working together to achieve group goals and providing feedback to peers in order to improve overall group tasks (Johnson & Johnson, 2009). The two
collaborative learning principles that were not as well exhibited by both case study students and the overall study learners were more advanced self-reflective and cognitive skills. The areas for continued improvement were: learners challenging each other’s assumptions in order to advance higher level artistic decision making and learners taking the perspectives of others and being better able to explore different viewpoints (Johnson & Johnson, 2009). There were a few examples of these two characteristics of promotive interaction, particularly in Harry’s reflections, but this is an area that could have perhaps been further explored in terms of wiki design and enactment.

Harry expressed the idea of motivation for his increased development of expressiveness that stemmed from working collaboratively with his peers, both in terms of critiquing others and receiving constructive feedback from them. Lebler’s study (2007) also cited the development of student creative and performance capabilities through interaction and collaboration within a community of practitioners. Though not a direct focus of this dissertation, motivation is an integral part of learning and of self-regulated learning skills. Motivational aspects of self-regulated learning must be a central part of the design of technology and other learning tools intended to promote independence and agency in student learning (Zimmerman & Tsikalas, 2005; Zimmerman, 2008).

**Student Self-Reflective and Metacognitive Engagement**

Harry, Ashley, and Kim all demonstrated instances of self-reflective and metacognitive engagement through various parts of their personal reflections and their wiki interaction. One of the first self-regulated learning skills embedded in the wiki was the goal development that each student was required to complete. Many students, such as Ashley, did not demonstrate the ability to set realistic, specific, or attainable goals during their first cycle of wiki interaction.
This was not surprising since the ability to articulate and formulate personal goals was one of the SRL processes that was intended to be developed through the wiki intervention. Almost all students, including Harry and Ashley, were able to improve their goal-settings skills through the iteration cycle and many ended up adding to their goals throughout the year as they continued to learn and develop.

Another self-reflective skill that emerged through wiki engagement was the ability to stay motivated and respond positively or constructively when goals did not resolve as anticipated, as opposed to becoming discouraged and abandoning the goals. All three of the case study students demonstrated adaptive responses to challenging musical situations or moments that came up throughout the study period. Again, the ability to formulate musical goals, articulate strategies to achieve goals, and revise and monitor musical processes (such as rehearsal progress) are all part of the SRL processes that were being explored and supported by the wiki intervention. Both Ashley and Harry reflected on the theme of lifelong musical learning through their acknowledgement of certain goals that would remain with them as they continued to develop as musicians.

The themes that emerged from the student reflections were not always expressed in similar ways; in fact, they were often in contrast by different individuals. An example is the issue of striving for perfection that came up both in reflections and focus group discussions in reference to the recording cycle process. The notion of striving for perfection through a focus on technical proficiency and objective standards has been critiqued in school music education particularly in performance-based music programs (Bartel & Cameron, 2004; Roberts, 1995; Zenker, 2004). Harry made reference to “trying for perfection” through the recording process, which motivated him to practice more (Focus Group Interview, June, 2013). In contrast, Ashley
mentioned the inevitability of making mistakes on vocal recordings and why she chose to learn from her musical mistakes instead of re-recording since she thought that “having the perfect recording [was] kind of silly” (Focus Group Interview, June, 2013). According to the teacher/researcher journal reflections, this notion of perfection was never deliberately articulated at any point, but perhaps it emerged from unconscious expectations and an unspoken focus on product and performance as opposed to process. This is very possible, given that the study school curriculum was performance-based and this reality shaped the vocal music program. As a new student to the vocal program, Kim described her experience with the wiki and recording expectations as having been more process-based, which was the intent of the intervention:

*I don’t think that there was ever much pressure put on it to be perfect and I think that it’s more a progress not perfection thing and I really didn’t mind it. I think that a lot of us appreciate being able to see what we did wrong.*

- Focus group interview, June, 2013

Harry, Ashley, and Kim each demonstrated a growth in the ability to analyze aspects of vocal production in other singers and in themselves. They also demonstrated development in abilities to assume increasing degrees of ownership in musical production through becoming critical listeners, singers, and musical mentors for their peers (Davidson et al., 1992). These are central self-reflective skills for singers and it is hoped that this awareness of self-development of musical abilities will lead to the next metacognitive self-regulative skill of continuing to monitor growth and improvement as a musician over time.

The next chapter summarizes study findings related to self-regulated learning, the creation of learning communities, the role of technology, and pedagogical approaches in music education. Further, Chapter 6 also outlines implications for music education and further areas of research stemming from this dissertation.
CHAPTER 6: Discussion and Conclusions

This research examined the integration of a wiki technology to support collaboration and reflection in a secondary school vocal music context. The wiki intervention aimed to support the development of self-regulated learning processes and shift the role of the teacher within the music classroom from one of authoritative director to more of a supportive guide and co-participant. The vocal wiki tool was created, analyzed, and developed in a design-based methodology informed by action research traditions. The design-based methodology drew upon the fields of the learning sciences and music education to produce a curriculum intervention with theoretical foundations in social constructivism, inquiry learning, and technology-enhanced learning environments. The study involved a pilot phase followed by two iteration cycles of approximately 12 weeks per cycle. Analyses included design analysis, enactment analysis, impact analysis, and design recommendations for each of the design cycles. Additionally, case studies of three vocal students were conducted in order to provide further exploration into the student experience of engaging in collaborative and reflective learning through the vocal wiki intervention.

This chapter presents findings in regard to the research questions presented in Chapter 1 as a summary of themes that emerged from the study in support of a broadening of pedagogical approaches and assessments in secondary-school music education. Study implications and future directions for research are also discussed. Finally, I present an introspective narrative through my role as the teacher in this study and offered some concluding thoughts.
Study Findings

An important goal of this dissertation research was to situate a curriculum design in my own practice, to iteratively improve that design through reflective cycles, and to discuss results through deep qualitative description. While some graphs were used to present the coded results, the results were not always statistically significant. Instead, the students’ words and images, as presented through design analysis and case study discussion, as well as my own reflections as teacher-researcher, presented some of the strongest findings in the study. From an empirical standpoint, the patterns of coded results can be seen as planting a suggestion of positive change that could be examined through larger scale or comparison studies.

The principal research question for this study was: How can a wiki-based technology environment help to engage secondary music students in collaboration and reflection?

Study findings support reflection and collaboration as meaningful processes contributing to the musical learning and self-reflective development of secondary school music students. The technology-enhanced learning environment used in this study design was effective in supporting the processes of reflection and collaboration by providing an engaging space for community building and learning.

Other findings from this study reinforced the notions that collaboration and reflection support secondary-school music students in establishing increasingly rich critical perspectives (Davidson et al., 1992), forming ideas about their role as both solo and ensemble singers (Upitis et al., 2013), taking further ownership of their music-making (Green, 2008; Lebler, 2007), and exploring their musical identities (Campbell, 1998; Cornett & Smithrim, 2001; Hoffman, 2008). Furthermore, reflective and collaborative practices led to increased communication about musical ideas, encompassing online and face-to-face dialogue, both between students and their
peers as well as between students and teacher. The online student dialogue often extended into ensemble class music-making and rehearsing, inspiring further critical discussion among the students in classroom settings.

The use of both audio and video recordings added another pedagogical layer, in that these technologies allowed students to hear their own voices and contributed to a sense of community and student empowerment. The vocal recording processes combined with the collaborative discussion and reflection motivated the students to focus on their musical goals and to continue to monitor and to think about their musical learning and progress. Students used a variety of the design aspects of the vocal wiki to prepare, perform, and reflect on their musical work and that these processes contributed to the development of self-regulated learning skills. Students engaged in various aspects of personal music-making, from practicing their singing to learning to play guitar informally, through collaborative and reflective processes in the vocal wiki platform.

More than four decades ago, Thomas Regelski argued that musical independence, the ability to make use of musical skills and concepts without teacher involvement, involved a change in behaviour. He felt that to be musically independent, the student needed to “arrive at a state of theoretical competence whereby his general musical experiences are formulated into principles commensurate with his ability (1969).” One of the study findings, as outlined in Chapter 4 through analysis of the repeated exposure student group, was the maintenance or slight increase in students’ self-reflective growth after engagement in reflection and collaboration with the vocal wiki. The processes that are involved in self-reflection, self-judgement, and self-reaction (Zimmerman, 2000) have the potential to lead to more agency and independence in music learning.
The collaborative and reflective learning practices, enhanced by recordings, that were featured in the wiki design contributed to the development of student musical independence. Design analysis revealed a number of features that reinforced student-centered learning during design integration. These design principles included: the inclusion of reflection, the use of recording, peer feedback and collaboration, and the encouragement of student autonomous learning through flexibility and choice in learning activities. In particular, there was a focus on embedding reflection and collaboration into the wiki design as these two dimensions were thought to be critical to the development of self-regulated learning.

Study findings support that agency and SRL skills resulted from the process of reflection on performance as well as collaborative discussions with peers. By engaging in reflection on their own musical experiences, students began to monitor their own musical progress and set realistic goals. Through the development of these SRL processes, students tended to become more independent as musicians because they began to think differently about their own singing and their contributions to the vocal ensemble. Shifting the focus of the performance-based music classroom that centered around the conductor to a more student-centered approach with a focus on reflection and collaboration involved a pedagogical shift in thinking as well as a challenge to the traditional role of the music teacher. These shifts in thinking for the music educator have been further outlined in the narrative at the conclusion of this chapter.

**Fostering Self-Regulated Learning**

The first specific research sub-question examined the design features of the vocal wiki tool: What design features promote self-regulated learning for secondary music students?

Data analysis was described in detail in Chapter 4 where aspects of the design, including design features, were examined through the dimensions of collaboration, reflection, and
performance through both iterations. The main design features that effectively supported student self-regulated learning were the inclusion of reflection, the use of recordings, peer feedback and collaboration, and the element of choice in learning activities. Many of these design features were intertwined in the wiki design, such as the use of ensemble recordings that were deeply linked to fostering collaborative dialogue among students. For this reason, I have chosen not to divide these design features into completely separate categories, but rather, to describe them holistically as they overlapped in function.

The design feature of the student recordings that included an ensemble-based performance process, followed by both individual and collaborative student reflections, was one of the more central design features in terms of potential effect on student self-regulated learning. Focus group interviews and data analysis showed that the ensemble recording process combined with the collaborative discussion and reflection motivated the students to increase their practicing or to practice more effectively and to focus more on their own contributions to the vocal ensemble in class rehearsals due to, in their words, the “sloppiness that we heard on the recordings” (Senior Focus Group Interview, June 2012). In all focus group interviews, the topic of the ensemble recordings came up as a positive motivator to work to improve through individual or collaborative practice sessions in order to perform to full potential within the ensemble. This motivating aspect was mentioned in both the ensemble and solo recording design features in the wiki:

*I think that recordings ourselves really helped me. If I had just had to sing “Stand by me” or “For Good” just for you at the piano I definitely wouldn’t have practiced as much because then if I did make a mistake, I could be like, yeah, ok. But then, like everyone was saying, you wanted it [the recording] to be perfect. Then when I would practice with the group, then the things that I’d worked on by myself when I was doing the recordings definitely showed up when you were practicing with the group.*

- Dana, Focus group interview, June 2013
The notion of increasing individual or small group rehearsal time outside of the classroom in order to contribute fully to the vocal ensemble is characteristic of more independent musical development and self-regulated learning development (Upitis et al., 2013). Furthermore, students reflected that the design features of the audio and video recordings were important to their individual development as musicians since these features helped them to become more aware of their own skill level as musicians in a variety of areas. Musicians are not always fully aware of how they are singing or performing unless they have a chance to see or hear it themselves. It is certainly effective to hear feedback from a teacher, but with the recording features of the wiki, students had the opportunity to “become their own critics” (Upper Focus Group Interview, June 2013). This developing metacognitive awareness of personal musical skill level was important in continuing to set goals and monitor progress, part of the forethought and self-reflective phases of the SRL process (Zimmerman, 2000).

Another key design feature in the development of increased musical independence was the opportunities provided by the wiki for peer collaboration through the individual public pages, recorded ensemble work processes, and the collaborative discussion pages. In the case study analysis, Harry noted that the motivation for his increased development of expressiveness came from working collaboratively with his peers, both in terms of critiquing others and receiving constructive feedback from them. The development of self-regulated learning processes and independent musicianship, such as artistic decision-making, can indeed be motivated by interaction and collaboration within a community of learners (Lebler, 2007).

Finally, the design features that created reflective spaces for the students contributed to their development of self-regulated learning. These design features included all of the individual and collective areas for reflective thinking. Students mentioned, in both focus group interviews
and individual reflections, that it was through the process of reflection that they became more aware of their goals in terms of monitoring and refining them, a central process in self-regulated learning. Additionally, students reflected on characteristics and challenges in their personal musical journeys that contributed to their musical identities. This demonstration of reflective growth is illustrated well through this excerpt from Elizabeth’s final progress reflection in her grade 12 year:

*I had always compared myself to other people, and I would always be upset that I didn’t have a clear voice like Ashley, or a strong belting voice like Samantha’s. I never liked my voice and was upset that I couldn’t change it. However, as the year went by, and as I did couple auditions for universities, somehow it made me realize that I was scared and upset about NOTHING. Since then, the whole thinking process in my brain has changed: I should take all the opportunities I get, and not fear whether I get them or not. I should not be jealous of other people, because this is who I am and I just need to live with it. I realized, by being negative about myself, I was limiting myself from learning and improving.*

- Wiki reflection, June, 2012

In this excerpt, Elizabeth reflected on where she began the year emotionally, in terms of her comparisons to other vocalists, as well as the turning point, which for her occurred after her university auditions. She reflected on these university auditions in other wiki posts and in this reflection, mentioned how reflecting about these experiences changed the “whole thinking process in [her] brain.” Elizabeth’s conclusion, which she came to through reflective learning and analysis on her musical experiences, was particularly significant since she realized that her outlook and decisions were actually limiting her own learning. In further wiki reflections, she outlined that she chose to actively change her behaviour and embrace new musical opportunities. Elizabeth’s reflective learning journey resonates with Regelski’s assertion that musical independence involves a change in behaviour (1969).
Creating the Learning Community

The second research sub-question looked at the new opportunities that the wiki might create for students to communicate: How does the wiki create new opportunities for music students to communicate and interact? This idea of the creation of a community of learners that included both students and teacher was an important part of the wiki design. Additionally, the wiki implementation involved the creation of new spaces for both online and face-to-face discourse, each of which had particular learning advantages.

One of the new opportunities for students to interact was created through the public pages with photos. These individual public pages served to better connect all of the members of the vocal class because not all of the students were necessarily friends outside of the vocal class or even in social media worlds. The vocal class environment may have been the only place that these students were interacting with each other as well as with me. The public pages created more of a sense of community within our vocal class because we all shared musical and personal information and images about ourselves through the wiki environment.

Another opportunity for students to interact was created through the ensemble recording and collaborative discussion spaces on the wiki. Although ensemble singing had always been a part of the vocal class curriculum, this new process and inclusion in the vocal wiki brought about changes to a familiar process. With the addition of the recording process, the singers were aware that they would be able to listen to their own progress as an ensemble and be an active part of ensemble sound development and artistic decision-making. This was an exciting change for the students and created several new interactive opportunities as they worked collaboratively on the recording process in face-to-face class sessions and then engaged in the collaborative discussion areas on the wiki primarily outside of vocal class time.
In terms of their interaction in these spaces, students noted during focus groups that they found it easier to make constructive comments in the online, asynchronous setting of the vocal wiki, as opposed to verbally and more immediately in the ensemble rehearsal setting of the vocal class. Through the researcher journal, I noted that both vocal classes were more constructive and critical of themselves on the wiki than they were in face-to-face rehearsal settings in class. The students also noted their more constructive postings on the wiki in a focus group discussion:

Tom: *I think that it was easier to put your feedback in the wiki. Like if we did that type of thing during class everyone’s all quiet and it’s just like “Oh I don’t want to speak up during class because I don’t want anyone to hate me cause of what I’m saying,” you know...*(Laughter). But if I’m just like typing it out on the computer, if I say something mean, I could just put down someone else’s initials! [Laughter]*

Suzette: *Like social networking!*

Tom: *But it is easier to be honest about singing on the wiki and I like that.*

- Upper Vocal Class, Focus group interview, June, 2013

My research journal reflections also noted that students, particularly in the second wiki iteration, contributed more verbally during face-to-face class rehearsals drawing on musical and technical elements that had been discussed on the vocal wiki collaborative pages. The online constructive dialogue often extended to the in-class rehearsals and inspired more critical discussion among the students in face-to-face settings. Additionally, the in-class discussion was critical yet positive in nature and focused more on vocal ensemble progress and artistic decisions such as dynamics, tempo, and musical phrasing.

These new collaborative spaces, both online through the vocal wiki, as well as through the strengthened sense of community established in the classroom, led to new student initiatives. In the June, 2013 focus group session, students from the Senior vocal class discussed the idea of having two individual goals and one class goal in future vocal wiki iterations. They wanted to extend their learning and development through the collaborative discussion pages into a
collective goal that they would develop together as an ensemble. Furthermore, the students initiated the creation of new interactive spaces on the vocal wikis during the second iteration: the Upper vocal class practice page and the Senior vocal class YouTube page. The Upper vocal class designed the practice page, where they posted student-created recordings of individual vocal parts, in order to support ensemble music learning for all students in the class community regardless of ability or experience. The Senior vocal class YouTube page was made up of YouTube postings of favourite performances, including performances of ensemble repertoire, by other vocal ensembles, choirs and solo performers. The YouTube page was used as a point of reference both in face-to-face discussion and online commentary regarding class performance practices. These examples of student-initiated collaborative spaces align with Collins and Halverson’s (2009) notion of interaction as a key learning process in the 21st century.

The creation of these interactive spaces also led to new communications between the students and teacher. I have already mentioned the advantage of the e-portfolio in allowing me to learn much more about the musical lives of my vocal students and I have further detailed this observation in the teacher narrative at the conclusion of this chapter. Additionally, I found that the wiki implementation led to more focused communication outside of class in the form of students chatting with me after class about musical ideas as well as through detailed email reflections. I noted in the researcher journal that I began to receive many emails with strong musical and reflective content about a month into the first wiki iteration as opposed to the usual student emails asking about deadlines or assignment details. The following email sent from an Upper vocal class student clearly reflects this motivation. He had emailed to let me know that he would be missing a vocal class in which I was hearing a repertoire test and had decided to record the song for me in advance and post it for me on his vocal wiki private page. This desire to
record his own singing outside of our class setting (particularly during the first iteration when this was not a requirement) demonstrated his strong motivation towards self-directed learning and improvement. Further, he went on to reflect how, through the self-initiated recording process, he discovered that a musical element of his performance was not as strong as it could be and he worked to fix it. He ends with a suggestion to the class on improving overall:

I just found out today that I have a cross-country meet all day tomorrow. So for tomorrow's vocal test, I recorded an MP3 for you to play. Unfortunately, I found out while recording, that my singing up until now was quite uneven. After practicing with the metronome, the MP3 I recorded is now decently rhythmical. That means that everyone may have to practice a bit more in order to fix their rhythms.

- Peter, Email excerpt, October, 10, 2012

Overall, the wiki not only created new opportunities for music students to communicate and interact, but these spaces also provided increased motivation for further learning through student initiatives and increased discussion in a face-to-face rehearsal setting. The motivating power of peer dialogue and collaboration in both online and face-to-face settings was mentioned numerous times in the researcher journal as a positive effect of the vocal wiki integration.

The Role of Technology

The focus of the third research sub-question was on the role of technology and the integration of the vocal wiki into the existing curriculum: What are the important considerations for integrating the wiki technology deeply into a course design?

One of the most important considerations for wiki integration was the inclusion of the recordings, both ensemble in the first iteration and then solo and small ensemble in the second iteration. The use of recordings, both audio and video, connected the wiki tool to what students perceived as “important” music class content in the performance-based program -- their vocal performance work. The inclusion of ensemble recordings caused students to visit and engage with the vocal wiki because they became interested in hearing their own performance progress as
well as reading the comments of their peers and posting their feedback. Many students commented on the impact of the recordings on their musical learning both in terms of hearing and correcting their own musical errors: “I did hear things that I was not aware of, mistakes, and then I could potentially fix them” (Charlotte, Wiki reflection, April, 2012) and the increased awareness of their own singing overall:

*The recordings made us more aware as we were singing whether we were practicing or performing. It made us more aware of what we were doing instead of just singing the song. We would try to add dynamics and all of that [musical expression]. It made us more aware because we could hear these things ourselves.*

- Thomas, Wiki reflection, May, 2012

Another consideration in integrating the wiki technology into the course design was making the wiki relevant to students. This was first done through the recordings as outlined above and then continued through other little ways of encouraging the students to engage with the wiki more frequently and regularly. These techniques included more frequent postings of ensemble recordings, especially during the second iteration, as well as the move towards shorter but more frequent collaborative discussion posts. Furthermore, the design consideration of allowing more student choice in assignments as well as student personalization of the wiki created a sense of ownership that fostered positivity around the vocal wiki. This positivity encouraged students to visit and engage with the vocal wiki both as a required part of their vocal course, but also as a reflective and collaborative musical environment that drew them in with a sense of community.

The opportunities for collaboration and peer interaction on the vocal wiki were important considerations in terms of design. During the e-portfolio pilot project, there were no opportunities for collaboration with peers and, therefore, little opportunity for shared learning with peers. The vocal wiki made collaboration explicit and expected through a more structured
design in order to increase peer interaction and learner control of the online environment (Collins & Halverson, 2009).

The final two considerations that guided the integration of the wiki deeply into the vocal music course were the inclusion of personal reflective spaces and a strong connection to student goals. The personal reflective space, where students posted individual reflections that were not shared with their peers, was a deliberate part of the wiki design that allowed for in-depth, personal reflections. This feature was important to student comfort levels in knowing that not everything that they wrote had to be shared. Students commented in focus groups that the inclusion of private reflective areas in the wiki were important to them for deeper or more personal reflections that they were not yet ready to share with their peers. Students used these areas to discuss more personal aspects of their musical lives, including musical identity, as well as the perception of their own developments as singers. The wiki was also designed to allow for a strong connection to personal student goals throughout the individual and collaborative areas, in an attempt to make reflections and postings more personal and relevant to the students themselves. This was done through the self-evaluation and goal-setting process at the beginning of each iteration, as well as the final process analysis that was added near the end of the second iteration cycle to connect initial student goals with their vocal development over the iteration. From a pedagogical perspective, this design feature also fostered student engagement and connection with their goals to their music-making over a period of time as well as continued monitoring of their goals and personal progress, both of which are central parts of self-regulated learning (Zimmerman, 2000).
Pedagogical Approaches in Music Education

The fourth research sub-question focused on any changes in the role of the teacher that accompanied a portfolio-based approach using the wiki: How does the technology-enhanced learning environment change the role of the teacher within the music classroom? This is an important question that I address first from the perspectives of the students and then further from my own perspective as the teacher/researcher in the narrative at the end of this chapter.

The ideas of self-regulated learning and musical independence focus on musical abilities with little or no teacher involvement. With this fostering of musical independence comes the question of how much teacher involvement is needed or, to change the perspective, how much can students learn and develop by being self-taught? These questions are especially relevant to the current secondary school students who are part of Tapscott’s Net Geners, the first generation of learners who have grown up in a digital world (2009). These students are increasingly becoming involved in their own learning by customizing and controlling their own learning environments, especially in an online context where they are, in many cases, familiar and comfortable both socially and as a learners (Collins & Halverson, 2009).

In technology-enhanced learning environments, teachers no longer have widespread control over presenting knowledge because the technology tools and scaffolds begin to play a role in guiding student learning pursuits (Slotta & Linn, 2009). In a music context, the extensive work of Green (2008) has led to the development of Musical Futures Canada, a new pedagogical approach that features a higher level of student autonomy and a lower level of teacher direction. Students in this study reflected on these ideas of increased agency in the direction of their music learning through focus group interviews:
Chris: I think that the best way to learn music on a very basic level is to teach yourself piano, teach yourself an instrument and then just kind of work with it. Piano is a bit more difficult, but if you know piano as a base then you can just about teach yourself whatever you want. Especially with YouTube and everything these days.

Interviewer: So, you don’t necessarily need a teacher?

Chris: Well, obviously it helps a lot and you’re going to get a lot more out of it. I took guitar lessons for a few years and that was beneficial because I learned a lot more of the technical stuff. But now I don’t have one [a guitar teacher] anymore but that kind of let me develop more and I was able to play more music that I wanted to play and develop more my style of music.

- Chris, Focus group interview, June, 2013

In this interview excerpt, Chris noted that students are capable of teaching themselves almost any instruments using YouTube or other technology scaffolds. He reflected on his own experience in first learning the guitar with a teacher and then continuing to learn and play on his own. Chris related his learning of technical musical skills to formal music learning with a teacher. He then noted that he was able to keep developing without his teacher; in fact, he was better able to find his own musical voice through playing music that he clearly enjoyed without the guidance (or the interference) of his teacher. Chris’ description very much correlates with the pedagogical approaches outlined in Green’s work as well as in the Musical Futures Canada program (Hutchison et al., 2013), which advocate that music learning is most effective when students’ passion for music is acknowledged and integrated into classroom activities. In the case of the vocal wiki design, this translated into incorporating student choice and customization of repertoire selection as design features, along with opportunities for students to learn and discuss music-making in collaborative settings.

This increase in student-directed learning and collaboration was also observed in group settings. Near the end of the second iteration, the nine grade 12 vocal students began to work, as a group, on an improvised version of the theme song from the television show, Friends. They
began this project during an impromptu lunch hour jam session and decided to work on it as a small ensemble performance project through the vocal class. This was a student-led initiative that began with an informal jam session and led to an in-class performance piece that the students learned collaboratively from YouTube videos and through group improvisation sessions. As noted in the teacher/researcher journal, these nine students were employing several of Green’s (2002) informal music learning practices including listening to and collaborating with peers, making musical decisions collectively, and copying the performance of other experts (through YouTube videos). The grade 12 students were also quick to record themselves in rehearsals of the song, using their iPhones, in order to listen to themselves and discuss ways to change and improve their interpretation (as noted in the teacher/researcher journal).

The idea of being your own critic, as a student, also came up in focus group interviews. This new role for students had an effect on the role of the teacher since the students were now taking on part of the role that, in previous teacher-centered models, the teacher was responsible for. This theme also arose in reflections in both of the wiki iterations as students noted how reflection and discussion made them more active in their own music learning:

_Throughout the year, reflecting on my vocal faults, strengths, and improvements has helped me better understand who I am as a singer and as a musician. This has led me to better understand where I need to improve and where I am particularly strong._

- Sophia, Wiki reflection, June 2012

Another indirect change to the role of the teacher, with the introduction of the wiki technology, was that more students had the holistic view that, in the past, only the teacher had in terms of ensemble growth and development. Feedback from the focus groups and analysis of the second iteration reflected this theme of the holistic musical perspective. For example, the students felt that the collaborative comment area gave them opportunities to reflect and comment analytically both on their own vocal part and other vocal parts. Therefore, they were suddenly
being challenged to listen and to think as the teacher or conductor as opposed to an isolated singer focusing only on their own part. Students reflected that this was a positive learning challenge that caused them to become more excited about musical processes, such as performing and writing music.

Building on the notion of the holistic perspective with regards to music-making, the wiki allowed for the students to be more engaged in the artistic decision-making of the vocal ensemble which, in the past, had been done only by the teacher or conductor. In their chapter entitled “Music for Life” in the book *Questioning the Music Education Paradigm* (Bartel, 2004c), Smithrim and Upitis describe a very moving and engaging choral performance where they observed the young singers “listening and watching each other and obviously living in the music (2004, p 77).” Smithrim and Upitis (2004) noted that this was an unconducted performance and suggested that these young singers were musically self-actualizing through their engagement in the musical and artistic process as they performed. Their description caused me to wonder if it was the absence of the conductor in front of the choir that fostered this freedom among the young singers and allowed them to be so present in the music. As I examined my own practice and my pedagogical growth through reflection in the teacher/researcher journal, I noticed that my personal struggle with the teacher role as conductor/director versus music facilitator/guide remained a constant theme throughout this dissertation research period. I noted in a journal entry during the second iteration that, as my students were becoming more engaged in collaborative and reflective practices in their music-making, there seemed to be less need for me to direct vocal ensemble work both in classes and in public performances. In this same reflection, I noted that this change was both exciting and slightly terrifying for me as a music educator. As I attempted to further examine my own
teaching, I pondered if the students were becoming more engaged in their music-making due to my attempts to make active changes in my pedagogical approaches or if their growing independence was actually motivating (and pushing) me to respond through changes to my pedagogical approaches? These are questions that I will continue to ask myself as I learn and grow as a music educator.

The vocal wiki provided a safe place for both individual and collaborative reflective thinking according to focus group students. During the second iteration, students began to reflect more on expressive aspects of the vocal recordings, such as dynamics and tempo shifts reflecting character and expression, as opposed to simple pitch and rhythmic accuracy comments. Students reflected that wiki recordings helped them to hear and change expressive aspects such as text inflection, phrasing, and dynamics in order to bring their musical interpretations to the next artistic level. This change in artistic decision-making due, in part, to the ensemble recordings and reflective discussion, indicated that more students were involved in aspects of artistic expression of the class performance pieces. Increased student involvement does not necessarily mean a decrease in teacher engagement in the music-making process, but it does indicate a deliberate shift in the role of the teacher to allow for more decisions and leadership to come from the student community.

**Implications for Music Education**

This dissertation built on new pedagogical directions in music education focusing on a technology-enhanced curriculum implementation in the secondary school music classroom from the perspectives of both the students and the teacher. The study focused on student engagement in reflection and collaboration through a technology-enhanced learning environment to highlight new pedagogical approaches. Self-regulated learning development was also examined in a
secondary-school music classroom context. This thesis represents one of the first applications of design-based methodology in the field of music education.

Because of the unique research context of this study, any generalization of findings should be done with caution and reservation. Study findings do contribute to our understanding of the role of technology-enhanced learning environments in terms of promoting self-regulated learning, students’ musical identity development, and design-based research in music education. The study also contributes new perspectives that support current music education literature on the evolving role of the music teacher as well as the creation of reflective and collaborative learning communities for music students.

This dissertation research supports the notion of a pedagogical shift in the role of the instructor, and new approaches aiming to incorporate reflective and collaborative opportunities for secondary-school music students – ideas also supported by music education research literature (e.g., Allsup, 2003; Green, 2002, 2008; Lebler, 2007; Seddon, 2004; Tobias, 2012, 2013). Additionally, implications from this study would be the need for more opportunities for student musicians to hear their own voices through recorded improvisations, rehearsals and performances, and to make artistic decisions about their own singing. Technology-enhanced learning environments in music education are capable of supporting these learning implications and new pedagogical approaches in secondary music education.

**Opportunities for Future Research**

This dissertation explored a technology-enhanced learning environment in support of student reflection and collaboration in a secondary-school music classroom context. As a result of examining my own teaching practice as part of the study context, I am left with many questions and further areas of learning that I am eager to explore. As a veteran action researcher
who is well situated for innovative, reflective practice, I recognize that there is a career’s worth of inquiry and exposition of ideas ahead of me.

After having studied student engagement in reflection and collaboration through a technology-enhanced learning environment in secondary-school music education, I am interested in examining these processes within different music learning contexts. One such area could include an exploration of collaborative and reflective processes within the community choral context with the support of technology tools. The community choir would provide a different performance-based music learning environment within which to explore the processes of reflection and collaboration. Additionally, a combined design-based and arts-based study focusing on a technology innovation within a community choral context might bring new pedagogical challenges and questions to the field of music education.

Another future research interest that stems from this dissertation is to explore connections between self-regulated learning in music education and the other performing arts, such as drama and dance, in a secondary school curriculum context. Many of the students in this study, who were also taking dance or drama courses, began to reflect on their artistic development in vocal music as compared to dance or to drama courses, noting areas of similarities in learning and other artistic connections. This theme of connection between the performing arts became more actively discussed in wiki reflections during the second iteration with the inclusion of video clips, when the collaborative dialogue began to focus on the artistic aspects of facial expression and movement in music as well as vocal production. This discussion was not only situated in aspects of performing; students extended the dialogue to compare the use of video to create and memorize choreography in dance or improvisatory scenes in drama to the composition process in music. They noted that they used recordings in music, for example, digital recordings on their
smartphones, as a means of capturing their melodic ideas until they could transfer them to a written musical format. There are many areas of further possible research involving technology-enhanced learning environments across the three artistic disciplines of music, dance, and drama in the secondary music context.

Focusing on the vocal or choral ensemble, an aspect of self-regulated learning that could be studied is individual and collective goal setting in vocal music ensembles. How do individual student goals align with the overall ensemble goals? How do collective ensemble goals motivate the community of singers? These questions position motivation, a central part of self-regulated learning, as an area of further focus and research. Further examination is needed into how self-reflective practices, including those developed in collaborative settings, might increase motivation for learning in music students. In order to foster student-centered learning and independence, motivational aspects of self-regulated learning must be a central part of the design of technology tools for learning. Several theorists have begun examination into motivational aspects of self-regulated learning (Meyer et al., 2010a; Upitis, Abrami, & Patteson, 2010; Zimmerman & Tsikalas, 2005; Zimmerman, 2008) and it is certainly a research area that warrants further exploration.

**Closing Reflection: Introspective Narrative as Teacher**

In the opening chapter, under researcher-background description, I noted that my pedagogical approaches and personal musical philosophy were constantly shifting as I continued to learn and develop as a music educator. I mentioned my use of e-portfolios in the music classroom as a motivating factor in examining aspects of informal music-learning strategies as well as self-directed learning through technology scaffolds. Once I began the PhD process, I continued to study music pedagogy, curriculum theory, and inquiry-based learning. As I was
exploring more about the field of the learning sciences, I was also examining music cognition
and musical processes in children. At the same time, I learned about design-based research and
became very curious about the application of this methodology in a music context. Due to my
unique e-school context and my desire to study an aspect of technology-enhanced learning
environments in music education, design-based research was an excellent methodological fit.

Having had experience with action-research and learning more about practitioner
research, I knew that my personal context, which included the dual role of teacher and
researcher, could work well for my study. Additionally, I was eager to plan a new intervention,
building on a reflective tool that I had previously worked with and that I genuinely believed in,
the e-portfolio, which became the basis of my pilot phase. As I observed in the first chapter, it
was through e-portfolio assignments that I became aware of the rich involvements and musical
lives of my students that were occurring outside of my music classroom. The e-portfolio tool
helped me, as an early-career teacher, to realize quickly that my students entered my classroom
with a rich musical history that needed to be respected and acknowledged, even if they had no
formal music experience. This link between the informal music lives of my students and the
musical life of our classroom was a crucial part of the e-portfolio that motivated me to design the
wiki intervention. The creation of new collaborative and student-centered spaces through the
vocal wiki tool was also one of the main pedagogical benefits to the teacher in terms of new
opportunities to make student learning visible.

During my PhD coursework, I became increasingly curious about student-centered music
classrooms and I began to question my role as the teacher/conductor within my vocal music
classroom and my choirs. This questioning of my personal pedagogy was both exciting and
frustrating for me as a teacher within a performance-based independent school context. This
dissertation research provided the opportunity for me to continue to reflect on my own practice as well as to examine student learning through a design-based methodology.

Throughout the wiki iterations, which were part of my vocal music curriculum, I remember being surprised at how quickly the students adapted to and looked forward to the ensemble recordings as well as the opportunity for their voices to be heard in collaborative discussions. Additionally, I was pleased at how seriously they took the wiki assignments, such as the vocal biographies and goal-setting assignments, and the deep reflections that they posted both individually and collaboratively. This was both inspiring for me, in my role of the vocal teacher, as well as motivating for me, in my role as the researcher.

In terms of student learning, I think that the recordings with opportunities for reflection and collaborative discussion had the most visible impact on student learning as well as on the development of musical independence. There was a distinct power shift in creating the opportunity for the students to hear their own voices and become critical listeners and artistic decision makers in our joint artistic process. Suddenly, both the students and I were part of the community of learners. This was exciting! Although the process of working collaboratively on performance pieces was more time-consuming than working in the traditional conductor-centered rehearsal classroom, it was also more creative and stimulating because the students were more directly engaged in the artistic process.

Through the vocal wiki implementation, I found that I was able to balance vocal course curriculum requirements in a more student-centered environment. I noted in the research journal that, although the performance process took slightly more class time due to increased student artistic discussion, students began to show learning shifts in their approach to vocal music classes. By the middle of both wiki iterations, students would generally arrive to classes more
prepared musically, with their parts learned and with artistic opinions about the songs. This increased student drive and enthusiasm were perhaps due to increased practicing, which was discussed earlier in this chapter, or due to motivation from listening to ensemble recordings and engaging in peer reflection.

There were certainly moments within this research process that were difficult for me as I worked through tensions and dissonances within my shifting pedagogical views and approaches as a secondary-school vocal music teacher and choral conductor. It has taken some years to realize, but I have come to understand that the teacher (or conductor) is not necessarily the most important person in the music classroom or rehearsal. There were times during the wiki implementation process, when I forced myself to step back and not lead vocal ensemble rehearsals. My purposeful retreat from the central leadership role created a new space for student voices to emerge. I quickly learned that, although I had more formal musical training and experience than my students, each of them brought unique musical ideas to the rehearsal process that would have been silenced had I not stepped back from the traditional conductor role. I was surprised at how the vocal wiki intervention not only created new collaborative communities for dialogue and reflection in the online context, but that these learning communities quickly extended into our face-to-face vocal classes. The wiki implementation gave me, the teacher, the freedom to break free from my traditional conductor role and begin to explore different roles as more of a musical guide or coach. This contributed directly to a shift in my thinking, because this tool made student learning and thinking more visible, and a more active component of my own craft.
Looking Forward: Thoughts for the Future

The time has come for us to depart
It may feel like the end but it’s only the start
I learned a lot of things when we’re together
You made it stronger
These lessons last forever
We say goodbye and we cry our last tears
Remembering all that we shared together
- Ashley’s song lyrics, November, 2012

Ultimately, in all educational settings, it is the teacher who must strive to create an environment that fosters student learning and growth. I believe that the creation of safe spaces where students can share, create, express themselves, and learn is the most important part of the teacher’s role. My personal philosophy, as an educator, focuses on the creation of a safe and positive learning space as the first priority in my vocal classroom or choral ensemble. This central focus on creating learning environments stems from my own experiences both as a teacher and as a student. As a teacher, I quickly realized that unless I genuinely showed that I cared about my students by recognizing their identities and their musical and life experiences outside of the classroom, they would not feel safe to express themselves in our shared classroom learning space. Further, I began to understand that the students needed to respect and value the unique contributions that they each brought to the learning environment by getting to know each other in our shared space. These may seem like simple concepts – ideas of respect and care for all in the learning community – but I find that these are critical foundations to a successful environment where learners can feel safe to take risks and express their artistic ideas. So often, it is these foundational ideas that get pushed aside in secondary school classrooms, or any classroom, when teachers feel pressured by external expectations or lack of time in curriculum delivery.
I believe that one of the major issues facing secondary music education and perhaps all formal education institutions is the need to prioritize the creation of the learning environment despite external pressures. Unfortunately, it is these external pressures, such as time constraints, extensive curriculum content, standardized tests, and administrative tasks, that seem to push teachers to focus immediately on the subject material to be learned, often in a transmission approach, instead of focusing on the learners themselves and the needs of the learning community.

When I began my PhD journey, I was motivated to explore technology-enhanced learning environments further because of my interest in providing safe spaces for students to actively build their musical ideas and express their artistic opinions. After having engaged with the vocal wiki tool for more than three years, I have come to a more nuanced understanding about the function of technology tools as not only providing safe learning spaces, but also enabling rich opportunities for student dialogue and reflections. My own role as a music educator has also come into greater focus, as I now understand more about the complexity of this role and the tensions that can occur between my instincts, as a choral conductor, to lead the music-making contrasted with my pedagogical goals to act as a musical guide and foster the development of self-regulated learning processes and 21st century learning skills.

In my experience, the creation of a positive learning environment also includes a space where 21st century learning skills, such as problem-solving strategies and creativity, can be a focus. Processes such as collaboration and reflection can support the growth of certain 21st century learning skills as students engage in reflective dialogue through a learning space like the vocal wiki. However, as has been previously mentioned in this dissertation, it can be challenging for teachers to incorporate these processes into traditional performance-based music classrooms.
both in terms of pedagogical shifts and time pressures to cover curriculum content and prepare for musical performances that are often required by school administration and the school community.

If the role of assessment is to support and improve student learning, then it follows that authentic assessments can form a central role in addressing some of these external pressures. Authentic assessment tools, such as e-portfolios, which include reflective elements to demonstrate student learning can support or even replace more traditional product-based assessments. Authentic or performance-based assessment tools can support rich learning experiences through reflection, collaboration, and student-led initiatives while also serving as alternatives to traditional tests. Through the use of technology tools, students can create online environments for increased dialogue and sharing of ideas that can occur outside of face-to-face classroom meetings while enhancing the overall student learning. Technology advances provide tools and options for the integration of authentic assessments directly into student learning processes. Through the use of a variety of assessment strategies, including peer assessments and self-assessments, students can become increasingly engaged in their own learning processes.

It is through rich learning experiences supported by authentic assessment tools that students experience both personal and artistic growth in secondary music classrooms. Kayla’s quote, from a culminating reflection after having engaged with the vocal wiki, serves to reinforce this idea:

*I will keep working on my vocal skills and stay involved with music even after I graduate. I am really proud of what I have gone through and how my vocal experiences contributed to my development as a singer and as a person.*

If I could only support my vocal music students in one aspect of their learning journey, I would strive to teach them the importance of becoming independent musical learners and staying engaged with music, in some capacity, throughout their lives. In order to remain relevant to students and the ways in which they communicate and learn, music educators must continue to create ways of incorporating the positive aspects of informal learning environments – both virtual and face-to-face environments – into secondary music classrooms.

All of this is not to say that music educators and choral conductors are obsolete, but perhaps to realize that we need to adapt different roles in our classrooms and choral rehearsals in order to create collaborative learning communities with our students and to give opportunity for them to hear their own voices. Technology provides us with the tools to create engaging and personalized spaces for learning that can extend beyond our classroom walls. We will all ultimately be richer musicians and educators through learning together and from each other. Let’s move forward in this direction, working to create engaging musical spaces where everyone is a learner.
References


Appendix A: Information Letter to Parents and Guardians

September 2011

Dear Parent/Guardian,

I am a doctoral candidate at OISE/UT in the Department of Curriculum, Teaching, and Learning, specializing in Curriculum Studies. I am inviting your child to participate in this research study entitled “The development of self-directed learning and musical identity through e-portfolio reflection in secondary school music education” which is carried out under the supervision of Dr. Jim Slotta, Department of Curriculum, Teaching, and Learning, University of Toronto.

This study focuses on the use of e-portfolios as a tool to facilitate reflective practice leading to self-directed learning and musical independence for music students, and, as a way to document the development of musical identity in secondary school music learners. The goal of this e-portfolio intervention is to help connect student reflections to the development of students’ musical self-identity and their epistemological beliefs. The social and collaborative dimensions of the e-portfolio technology, for peer review and creating shared knowledge and a more leveled community of practice, is a key feature of the design process.

The permission of [name of Head of School] has been given to me to conduct this study through the vocal music program. The purpose of this letter is to request your permission to include your son/daughter in the project. The e-portfolio is a required curriculum element in the senior music classes and U2, S1 and S2 vocal students will all be working on wiki/e-portfolios as part of their coursework in the vocal music program. Because any activities associated with this project will occur as part of your child’s regularly scheduled class, they will not require any additional effort on his or her part. If students agree to be a part of this research project, their portfolio reflections will be incorporated into this study. The information derived from these reflections will be kept in strict confidence and reported in such a way that individuals and schools cannot be identified. Additionally, students may choose to be part of a small focus group, in the spring after wiki course work has been completed, to discuss the wiki/e-portfolio process. If students choose to be a part of the focus group, their discussion will be audio-recorded and used as part of data analysis. The data obtained will be used in the process of completing a research project for my doctoral studies at OISE/UT. Permission will be given to my supervisor to view the data if required during the research process.
All of the collected data from the e-portfolios will be secured by password. All raw data (i.e. the e-portfolio reflections) will be destroyed three years after completion of the study. Participation in the project is voluntary. There are no risks associated with participation in this study and students are free to withdraw from the research at any time. Student participation in this study in no way affects their grade for the course. If students decide not to participate in the study, or if they withdraw from the study at any time, their grade will not be influenced in any way.

Through deeper understanding of collaborative performance-based assessment tools, such as the e-portfolio, this study might make a significant contribution to the development of future music education programming in schools. I sincerely hope that you will take a few minutes of your time to consider your students’ valuable contribution to this study. If you are agree to participate, please discuss your agreement with your child. (S)he will sign a form of consent on the day that the e-portfolio is introduced and give the form to Mr. _____________ to ensure confidentiality.

If you do NOT want your child to participate in the research, please complete and sign the form below or indicate so by e-mailing Mr. _____________ by January 30, 2012. If you have any questions about the study, please feel free to contact me at [school phone number and email address]. Published study results will be made available for students and/or parents who are interested. Any questions about teachers’ or students’ rights as participants can be directed to the University of Toronto Ethics Review Office at: ethics.review@utoronto.ca or 416-946-3273.

Sincerely,

Sarah Morrison

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►If you DO wish to participate, please discuss your agreement with your child. (S)he will sign a form of consent at [school name] through the music program. No further action is required.

►If you do NOT want your child to participate in the research, please indicate so by emailing Mr. _____________ at [email address] OR by completing and signing the form below and submitting it to Mr. _____________.

Child’s Name: _______________________________

Parent/Guardian Signature:__________________
Appendix B: Information Letter and Consent Form for Students

Student Information Letter

September 2011

Dear Student,

In addition to being the vocal teacher and choral director at _________________, I am also a doctoral student in Education at the University of Toronto. As part of my thesis work, I am conducting a research study at _______________. A research study is a way to find out information about teaching and learning. My research study examines the wiki/ePortfolio tool that we use in our classes and how it can be used to best support music learning. All students in grades 10, 11 and 12 vocal classes are invited to participate in this study. The information provided from this study will be valuable to the music education research community to understand how teachers develop ePortfolio curriculum, and how students learn from this curriculum. It will also be of value to the school administration and other teachers at _______________, in terms of promoting innovative teaching practices.

It is important that you know that [names of Heads of School] have both approved of this study. Because the ePortfolio work associated with this study will occur as part of your vocal class curriculum, participating in this study will not require any additional effort on your part. Participation in this study involves giving your permission for me to use your ePortfolio work in my study, beginning in June 2012, once this portion of our course work is completed. Your participation in this study in no way affects your mark for your wiki/ePortfolio assignment or your grade for vocal music. If you decide not to participate in the study, or if you withdraw from the study at any time, your final mark will not be influenced in any way. All of the study data (including your wiki/ePortfolio, if you chose to participate) is kept completely confidential and at no time will your name or the name of [school name] be identified in any published document, including my thesis.
Occasionally, I will conduct a focus group discussion about the process of working with e-portfolios to gain a deeper understanding about your experience. If you choose to be a part of the focus group (not a course requirement), I will be audio recording the discussions and your consent is required for this. I am the only one who will have access to any of the information collected within this research. At no time will your name or the name of the school be identified in published documents. All information that is collected will be kept in locked computer files, with student names and identities replaced by anonymous ID numbers. If you have any questions about the study, please ask me at any time. I will not be aware of who is or is not choosing to participate in the study until after June 2012 when this portion of our course work is over.

If you would like to participate in the study, please fill out the form below, sign your name, and return this form to Mr. __________.

If either you or your parents/guardians have any questions about the study please feel free to contact me by phone: [phone number] or through email: [email address]. Any questions about your rights as a participant can be directed to the University of Toronto Ethics Review Office at: ethics.review@utoronto.ca or 416-946-3273.

Sincerely,

Sarah Morrison
Vocal Music Teacher, Choral Director

[Name of school]
I, (clearly print your name here) _____________________________, have read and understood the student information letter regarding participation in Ms. Sarah Morrison’s ePortfolio doctoral study.

I indicate my permission to participate by signing below.

Student’s name: _____________________________

Student’s Signature: ___________________________ Date: __________________________

Please return this form to Mr. __________________, not to Ms. Morrison directly.