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BYU VOCAL PERFORMANCE DATABASE

Jana Chapman

A development project submitted to the faculty of
Brigham Young University
in partial fulfillment of the requirements for the degree of

Master of Science

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Abstract

BYU Vocal Performance Database

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Master of Science

The vocal performance database is a tool by which BYU vocal performance faculty and students may practice, assess, and review vocal performances, including practice juries, recitals, and end-of-semester juries. This document describes the process and results of designing, developing, implementing, and evaluating the vocal performance database.

By using this tool, vocal performance professors are able to give faster, more quality feedback to students following the jury. Students are able to receive legible feedback from their professors in a timely manner.

Keywords: vocal performance interface, database design, performance assessment

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Introduction

Teaching is a leadership role; a balance between handling administrative responsibilities and mentoring each student individually. As professors become too occupied with demands of preparation, organization, grading, and research, they become less useful as personal coaches to students. To prevent this from happening, many teachers are turning to technologies that can automate grade calculations and keep track of student progress so that teachers may be better prepared to provide helpful feedback to students and have more time to meet with students one-on-one.

Problem Presentation

In the world of education, many people understand the value of providing students with timely, individual feedback. The Brigham Young University (BYU) School of Music is no exception. At the end of each semester, vocal performance students perform for a set of jurors to receive feedback on their progress in the program. This feedback is typically given in the medium of rushed, hand-written notes. However, as technology plays an increasing role in education, alternative methods may now be considered. The purpose of this development project is to digitize the jury process in order to simplify the feedback process and to make that feedback more quickly and easily accessible to BYU vocal performance teachers and students.

Design Constraints

As with most design challenges, this design challenge comes with constraints, both from resource limitations and client preferences. While these constraints may seem somewhat limiting, they also provide boundaries for the scope of the project.

This project was done in conjunction with the BYU vocal performance program. The vocal performance program has already determined its methodology for measuring vocal

performance, so this project is not intended to look at theories of measuring vocal performance, but rather to create a tool to better implement the current methodology. Although this project may provide the program with insights into future evaluation of the metric methodology, those insights will not be discussed within this project.

Resource-imposed constraints. This project was completed through the BYU Center for Teaching and Learning (CTL), and was therefore constrained to CTL work hours and resources.

There are several phases to the development and implementation of this project, but this report pertains only to the first phase. The first phase included the basic functionalities of the interface and database, namely the ability to log in to the database, manage users, enter jury scores and comments, update teacher profiles, and e-mail jury results to the administrator. Although not yet created, the second and third phases will include a student interface allowing students to apply for a jury, update profile information, track their repertoire, and view jury scores and comments online. The second phase will provide functionality for teachers to submit other scores into the database, including scores from individual voice lessons and grades from language specialty labs, which are used to calculate a student's final grade. The third and final phase of this project will provide a built-in help system for future users of the database, as well as revisions to existing functions.

Client-imposed timeline. This first phase of the project included the ability to enter in jury scores and comments, and then e-mail them to the vocal performance student. This needed to be completed for use in the April 2010 vocal juries.

Detailed Analyses

The analysis phase of the project provided the basis for the needs and goals of the project. The analysis consisted of a target population analysis, a current training and resource analysis, and an existing product/competition review.

Target population analysis. The primary users of this tool are the BYU vocal performance faculty and students. Many of the faculty members are familiar with the jury process. They are computer literate and can type faster than they can write. This means that by using a tool such as the vocal performance database, students can receive more robust feedback on their performances. Some faculty members have previously spent hours entering grades and doing the calculations after juries to provide the scores to students. To alleviate this burden, the tool from this project will allow faculty to spend more time giving helpful feedback to students in a timely manner.

The vocal performance students are all at different levels of the music program. Of the vocal performance students required to perform in a jury, the 100-level students are generally first-year students in the program, the 200-level students are generally second-year students in the program, the 300-level students are third-year students in the program, and the 600-level are graduate students in vocal performance. This assessment tool was designed for students at all of these levels of the program. For all these students, the jury is a way for them to display what they have or have not learned throughout the semester. Using the new database will allow students to track their progress through multiple semesters across all levels of skill, and help them track their progress in fulfilling graduation requirements.

Current training and resource analysis. The current jury process is a paper-based system in which each juror is given a sheet of paper on which to record his or her appraisal of the

student's end-of-semester performance. After a semester of preparation for this culminating performance, each student signs up for a time slot on the sign-up sheet on the administrator's door. On the day of the jury, students fill out their application forms with a list of songs that they have prepared to sing, as well as other information such their personal contact information and status in the program. Carbon copies of the application form are then put into a folder and handed to each of the jurors. The jurors refer to the carbon copies of the application form to select the songs they want the student to perform for them. Then the jurors write their individual notes regarding how the student meets the performance criteria. The notes are not usually connected with a certain time within the song. Sometimes jurors run out of room on the paper or time to write comments. The papers are then collected to be reviewed by the administrator. At a later date, the administrator retrieves the scores and comments, enters the scores into a personal database, and then returns copies of the jury's comments to the students' teachers. The teachers then fold the form with the scores in half so the scores and comments cannot be immediately seen, and posts the forms on their office doors for the students to come pick up at their convenience. Some teachers take the opportunity to go over the feedback with the students when they come to retrieve their results, but some students do not pick up the feedback until the following semester.

The current jury process has three main weaknesses. First, it does not allow time for faculty members to provide quality comments in handwriting. Second, students do not have easy access to the faculty comments. And third, the process uses too much paper, which is often lost or misfiled. Because of these weaknesses, students complain that faculty comments are short and unclear pertaining to the detail of what is referred to and the legibility of the handwriting.

Existing product review. There is not currently an online tool that allows the BYU vocal performance program to rate student performances based on BYU's unique criteria and assessment methodologies with the level of security and the processes required by the program. However, computer-aided performance assessment is an increasingly popular subject in educational journals. Atkinson and Davies (2010) define computer-aided assessment as "any instance in which some aspect of computer technology is deployed as part of the assessment process." Gronlund (1998) also suggests that using computers for assessment may relieve teachers of time-consuming tasks and allow for tracking of student progress. Therefore, tracking student progress can in turn "contribute to greater instructional use of achievement tests" (p. 131). By keeping track of students' scores and comments through the semesters, the vocal performance database will allow teachers to help students see how the students have progressed or how they still need to progress, resulting in greater instructional use of juries as achievement tests.

Design Goals

The goals of the first phase of the vocal performance database project were to allow students to receive more prompt feedback regarding their jury performances and standings in the music program while maintaining the teacher jury experience, and to provide a way to maximize time allotted for jurors to provide meaningful feedback. In addition, this database would allow an administrator the ability to communicate scores and comments with teachers and students in a timely manner. While striving for these goals, an additional objective of this design project was to minimize paperwork within the vocal performance department.

Design Criteria

The criteria for this phase of the project are directly related to the design goals. For this project to be successful, teachers should be able to provide their students with access to meaningful, legible feedback at least three days from the time of their jury. The interface for the system must be similar enough to the paper-based system that it does not interfere with a juror's ability to enter scores and comments. The desired effect is for the tool to maintain the same type of feel and process as the paper-based method, but to allow for greater efficiency. Jurors must sense that they are able to provide more meaningful feedback faster. And finally, the tool must minimize department paperwork.

Design Solution

Following the analysis, the solution consisted of three parts: process and rationale, relevant design principles and research, and the design of the solution itself. Although the design did change and evolve as it was created, changes were made to make the project fit the needs of the developers and audience. The design was also created to accommodate maintainability and sustainability, as well as the production and evaluation processes.

Process and Rationale

The Analysis Design Development Implementation Evaluation (ADDIE) model is the traditional design approach among employees of the CTL and was therefore chosen as a familiar method of design for this tool. According to Molenda (2003), this model generally consists of five phases. The first phase is analysis, which consists of meeting with the client and determining the client needs. The second phase is design. This phase includes creating and editing storyboards and prototypes of the end product and describing how things should function. Development is the third phase where the project is handed to a production team of programmers

and artists to actually create the product. Fourth is implementation, or when the product is actually tested. Finally, the fifth phase is evaluation. This phase summarizes how the project meets the design goals and criteria.

The analysis phase consisted of discussing the original jury process and possible improvements to that process with the client. Next, the design phase included several storyboards and drafts of the interface created using Microsoft Visio (see Appendix A). Following the design phase, the development phase included working with a programmer to create the Flex-based web database and interface. Implementation included familiarizing vocal performance faculty members on how to use the interface and database and using the tool during April juries. Finally, the evaluation phase consisted of summarizing the results of a series of Qualtrics surveys distributed via e-mail.

Although the general ADDIE process was used, some processes of the ADDIE model were tailored specifically to this project. For example, steps that are sometimes included in the ADDIE process, such as a task analysis and an objective analysis, have been purposely left out of this project. Because these steps are usually used when analyzing the content of instruction, this type of analysis did not add to the project since the jurors create the content of instruction at the time of the jury. In addition, some steps were added to the ADDIE process, such as the creation of a flow chart to demonstrate the work flow of the original and digitized processes during the design process.

Relevant Design Principles and Research

In his article, “What and How Do Designers Design,” Gibbons (2000) suggests that looking at a design with a layered view allows a designer to change the product when necessary

with minimal disruption to the other layers (p. 22). In light of this perspective, the design of this project was created in a layered view of design to make the design easier to adopt and change.

Relevant design principles also include the use of design-based research. Design-based research provides research and learning opportunities through creating and editing a design (Brown, 1992; Wang & Hannafin, 2005). Each version of the design improved from the changes made from the use or discussion of the previous design. Similar to traditional research, in design-based research the vocal performance participants are the subjects of this study, and, like a traditional evaluation, analysis of the success of this design provides helpful insights into the design and success of future projects within the specified area of vocal performance assessment.

The value of immediate feedback. As opposed to delayed feedback when students receive comments after an excessive period of time, thereby decreasing its helpfulness, immediate feedback is feedback given within a short period of time following the assessment. When feedback is given too late, students often misinterpret scores and comments. Schooler and Anderson (1990) argued, “Immediate feedback provides more guidance than does delayed feedback by preventing the subject from exploring incorrect solution paths” (p. 702). Providing vocal performance students with immediate feedback will provide them with a more accurate reflection while the memory of the performance is fresh in their minds, thus increasing the likelihood of improvement. Otherwise, students must recreate the jury in their minds in order to apply the feedback from their professors. Also, Poulos and Mahony (2008) state that students prefer early feedback rather than delayed feedback.

Some studies suggest that depending on certain factors, the ideal timing of immediate feedback may be relative. For example, if a student is learning a simple task, too immediate of feedback could prevent learning and cause annoyance (Clariana, 1990). Other studies indicate

that the impact of feedback in higher education depends on when it is bestowed, the perceived significance of the feedback, and the student's stage of university career (Paulos and Mahony, 2008, p. 152). In essence, immediate feedback has a relative definition. That term is actually relative to the student's context; where they are in their university career, and stage of learning.

The value of digital feedback over handwritten feedback. Studies suggest that students prefer electronic feedback because the markings are clearer, there is generally more feedback, and it is easier to read (Denton, 2001). Additionally, digital feedback is more accessible. Handwritten feedback is available only to the person who has the actual paper; whereas digital feedback can be posted online and thereby made accessible anywhere there is internet access.

One advantage of digital feedback is the potential for using a pre-populated response bank. A pre-populated response bank is a text document listing common responses for various criteria. As teachers give responses, often students struggle with the same kinds of problems. A teacher can prepare responses for those common problems in advance. These responses might include detailed descriptions of the misunderstanding and a possible solution. This option allows teachers the ability provide more thorough feedback in a very short amount of time (Karlsson, Liljestrom, & Juslin, 2009; Denton, Madden, Roberts, & Rowe, 2008). Although this particular project does not yet use this feature due to the initial preferences of the BYU music faculty members, it will be included in subsequent phases of the project.

Initial Solution

To facilitate more immediate, legible feedback, the initial solution was to create an online database in which to store teacher feedback, student scores, and student repertoires. As previously stated, the main priorities for the first phase of the project were to limit necessary

paperwork and to allow students to receive more prompt, legible feedback regarding their jury performances. These goals required certain functionalities from both the interface and the database. For instance, before first-time users could be allowed into the database, the interface had to provide a mechanism for an administrator to add students and teachers into the database. The database had to be able to verify that the user was affiliated with BYU, using a BYU Route Y identification, and store pertinent information for each user, including the user's role (teacher or student), lab type (Italian, French, etc.), status (active, inactive), and e-mail address. The teachers could then edit their e-mail addresses if necessary. The interface also required functionality for scores and comments for each criterion, the vocal performance score, and also any general comments, to be entered into number and text boxes that are saved in the database. This interface needed to look similar to the existing paper form to ensure that teachers could easily identify where to put their comments and scores. Another functionality included programming the "submit" button to send an e-mail to the administrator with the professor's results of the jury.

Design architecture and modularity principle. The design structure of this database is based on user types and functionalities. The design is modular insofar as it maintains the design layers of the original jury evaluation process as described by Gibbons (2000). Using design layers allows a designer to create a maintainable and extensible product that will change with the least amount of disturbance to the functional design of the project.

According to Gibbons (2000), a design can be separated into six different layers: the control layer, data management layer, strategy layer, message layer, content layer, and the media-logic layer. By constructing the design in layers, a layer may be changed without significantly affecting other layers of the design. The control layer refers to the ways the user

can interact with the design, such as clicking a button, touching a screen, or turning on and off sounds. Additionally, the message layer refers to the method of feedback for the user, the content layer refers to the content that an application is teaching, and the media-logic layer includes all of the multimedia components that must go in to the design.

In this project, the control layer is different for each user type. The administrator can manage database users and organize the jury. Professors can score juries, select students and submit records as well as type in scores and comments. Students have the control they need to view jury scores. In the future, the design includes being able to cut and paste comments into the database from other sources, such as a pre-populated response bank.

The other layers of the project are relatively simple. The data management layer consists of all data entered by administrators, faculty, or students, which is stored in the database. The strategy layer includes labeling types of feedback, allowing teachers to judge a performance based on a set of criteria, and allowing a student to see the feedback in a format similar to the format in which it was created. The messages in this design include criterion scores, a jury performance score, a vocal performance score, and feedback comments from jurors. Because the jurors provide the feedback for this project, the jurors create the content layer. The final layer, the media-logic layer, rests in the online program itself.

Surface design. The new database appears to the user as a dynamic website made of several pages and interfaces. The database allows users to login for specific privileges and to view a variety of screens displaying information from the database.

For this particular design, there are three different surfaces—one for each user type: student, teacher, or administrator. For the first stage of the project, the student surface was composed within an e-mail that listed the scores and comments from each juror. For a sample email, see Appendix B.

For the teacher, the surface layout shows a form of how to rate a jury, similar to the paper form, listing each criterion on the left of the page with a space for scores and the comments pertaining to each criterion on the right. The similar surface appearance allows a teacher to quickly become familiar with the interface of rating a jury so they will readily adapt to using it (see Figure C1 and Figure C2). The administrator's surface design includes three web pages that include the rate jury interface used by the teachers, and the user management interface, which allows the addition of other teacher and student users into the database. Teachers are listed below one tab, and students are listed under the other tab to distinguish between the information requested of the teachers versus the information requested of the students (see Figure D1).

This surface design, in combination with the speed of the internet, allows the student to receive the feedback in the fastest amount of time. It allows teachers to quickly type their feedback and return it to the student via the administrator. The design also allows the administrator the ability to review and return scores and comments faster.

Logic/software design. The new database included several different online parts and interfaces, including a login screen, a jury form, an interface for communicating scores and comments to students, a user management piece, and a system evaluation tool.

The login screen allowed administrators, students, and teachers to login to the database. The jury form is in an electronic format visually similar to the existing paper form, including areas for comments and scores concerning vocal technique, language diction, musicianship, and expression. Scores and comments were communicated to the students through an automated e-mail. Following the jury process, the administrator reviewed scores and comments. Next, the scores were forwarded to the students' teachers for review, who then sent them to the students. This process ensured communication through all levels of instruction.

Jury Response Form

NAME _____ DATE _____

Selection 1: _____ Selection 2: _____

_____ **Vocal Technique**

1 to 6

- Posture
- Breath
- Phonation
- Chiaroscuro*
- Ring
- Even Scale

_____ **Language Diction**

1 to 4

- English
- Italian
- German
- French
- Other

_____ **Musicianship**

1 to 5

- Intonation
- Accuracy Pitch/Rhythm
- Dynamics
- Phrasing
- Style

_____ **Expression**

1 to 5

- Stage presence
- Gestures
- facial expression
- Commitment

_____ _____ _____ _____ _____

Jury Lab Teacher VPS Jury Signature

Figure C1. A copy of the original paper-based jury form.

Mozilla Firefox

http://voicetracks.byu.edu/

Welcome, [David Spitzer](#) (edit) | [Notifications \(0\)](#) | [Log Out](#) | [Help](#)

[Rate Auditions](#) | [Teacher/Lab Scores](#) | [Jury Summaries](#)

04/15/2010 | [View Summary](#)

Rate Audition | [Repertoire](#) | [Past Auditions](#)

Auditionee Information:

 [View Complete Profile](#)

Teacher: [David Spitzer](#)

Major:

Course: 160

Voice Lab: English

Expression 0 (0-4)

- Stage Presence
- Gestures
- Facial Expression
- Commitment

Musicianship 0 (0-4)

- Intonation
- Accuracy Pitch/Rhythm
- Dynamics
- Phrasing
- Style

Language Diction 0 (0-4)

- English
- Italian
- German
- French
- Other

Vocal Technique 0 (0-8)

- Posture
- Breath
- Phonation
- Chiaroscuro
- Ring
- Even Scale

Jury score:

VPS (0-5): 0

[Submit](#)

Transferring data from voicetracks.byu.edu...

Figure C2. A screenshot of the resulting database jury form.

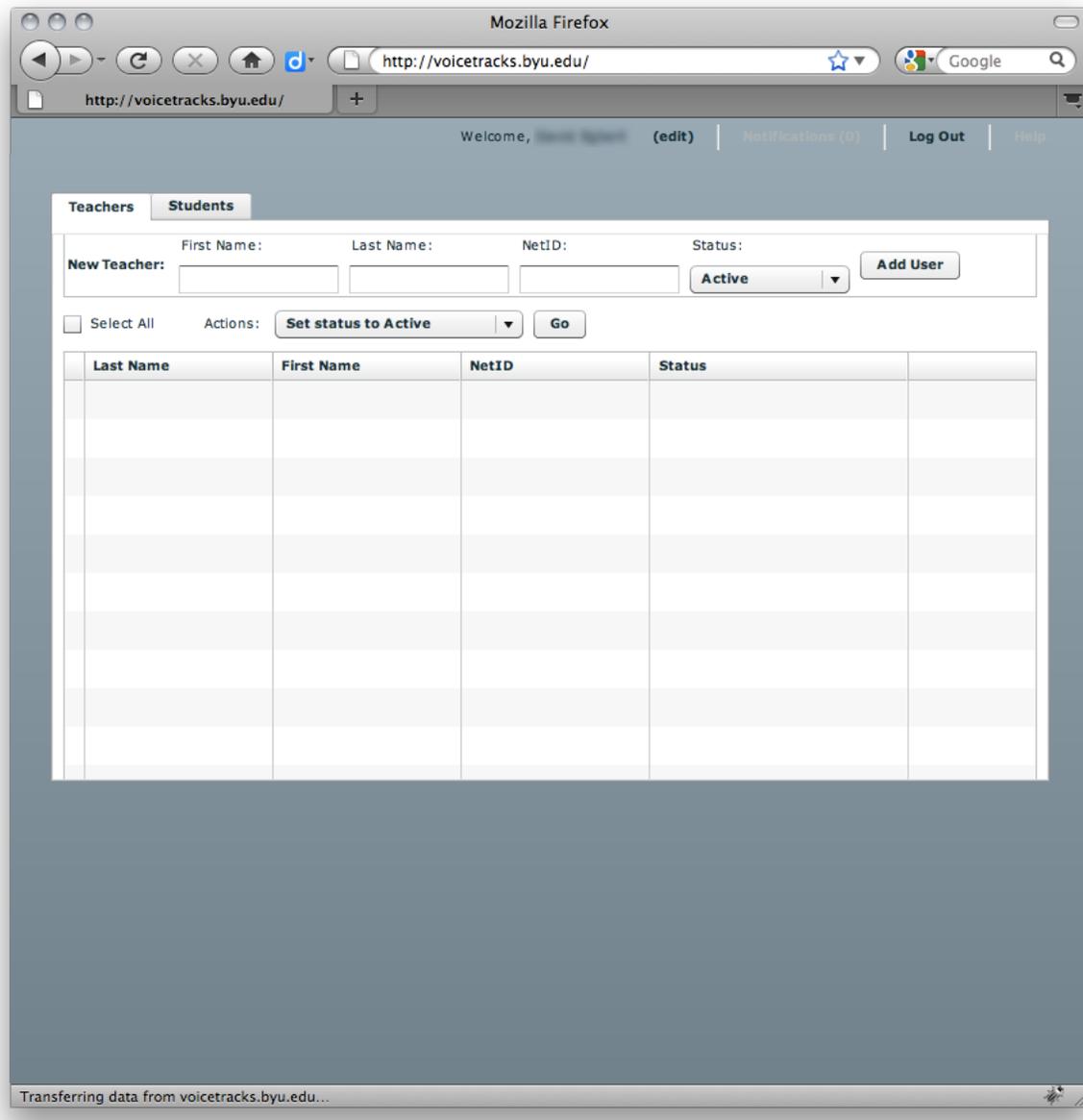


Figure D1. A screenshot of the resulting user management piece of the project.

The user management portion of the design was available only to the administrator. This portion of the application allowed the administrator to view all the users in the database and to assign teachers to students within the database.

As part of the evaluation, an online survey was distributed through e-mail to teachers and students, addressing a combination of subjective and objective questions regarding their personal experiences using the vocal performance database.

The logic of the program requires programming software for the developer, database management for the web server, and plug-ins for the user. The choice for platform and programming languages was based on the needs of the client and the developer's preferences and skill sets. The tool is made with a MySQL database that interfaces through php with a Flash interface developed in Flex, which is now called FlashBuilder (see Figure E1).

Evolution of the Design

The design of the project changed with each new version. As more feedback on storyboards and user needs was collected, new functionalities were added or improved. The evolution of the design was ultimately influenced by user testing and practical issues.

Design versions. The following section will detail six versions of the interface including a description of the prototype and the change made to the interface at that point in the design process. The interface designs included drawings of the buttons, panes, and content of each page.

Version One. This design was the first attempt to create an interface for this project. This design focused on the basic needs of the product, namely the manage users component, basic navigation, and the jury rating form (See Appendix A, Figure A3).

In the first design of the system, a list of functions, according to each type of user, appeared as the user logged in which asked them what they would like to do. There was only

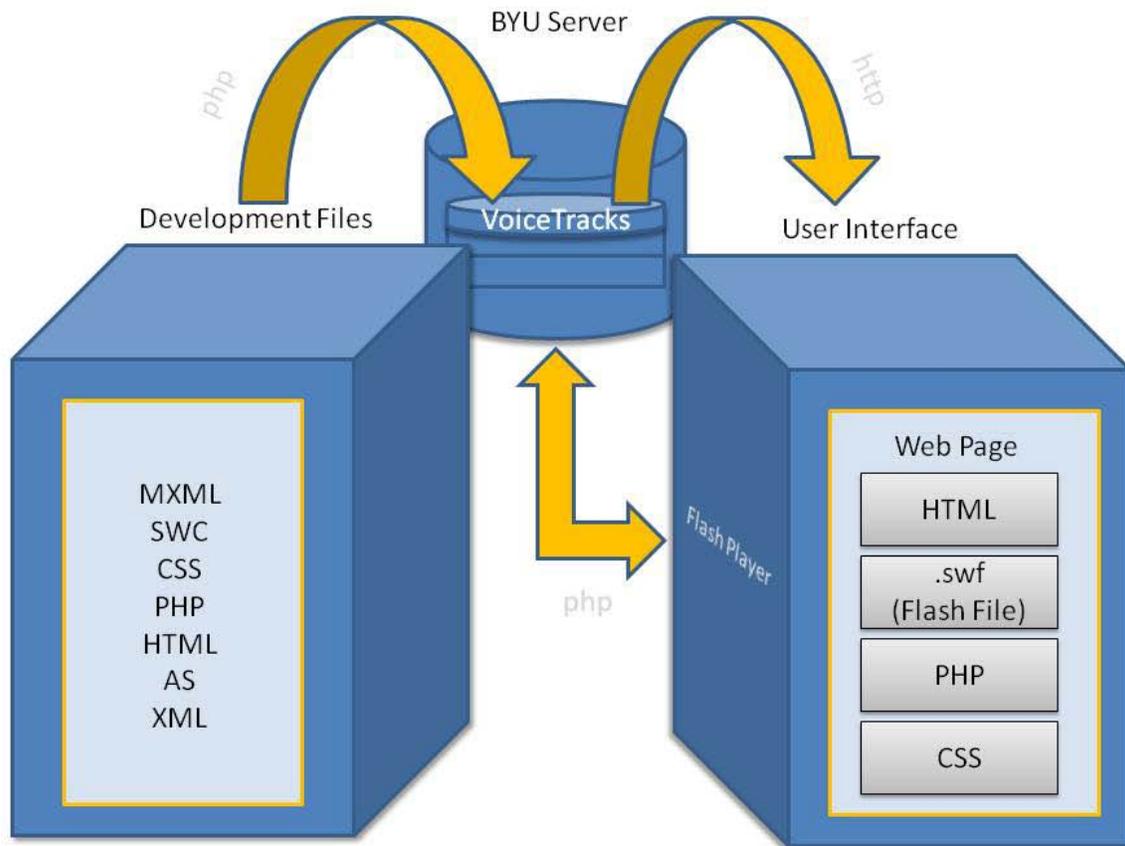


Figure E1. Diagram of the logic layer of the database.

one manage users page, with a pop-up window for adding another user. There was also functionality to manage scheduling the jury dates and times according to skill level in the program. For each action performed, a text bar would pop up and review for the user what action was just completed. The jury form was created in this phase and remained largely unchanged through the final version. The navigation for viewing previous auditions consisted of two scrolling menus—one with a list of dates of auditions, and one with a list of teachers and report—placed vertically on the left side of the page. Teachers had to go to separate pages to enter either final grades for student private lessons or lab scores. Students revised their profile information on the same page as the audition application. In general, there was a lot of empty, unused space, and it took too many clicks to get the user to the desired location.

Version Two. After receiving feedback of the first version from the program administrator, storyboard edits were made. The main changes pertaining to this version included revising the navigation option.

In this version of the design, users had drop-down menu navigation options on the initial page after logging in, instead of links to options.

Version Three. This version of the design was created following an artistic rendering of the interface and meeting with student focus groups.

In version three of the design, navigation was changed to a bar of options at the top of the page. Right when the users logged in, they went immediately to a page with user-specific functions. In this version of the design, the scheduling portion was omitted, as it would require too much time from teachers and administrators before the jury could occur in order to make this function work each semester. Instead of having to select a student from a table to view his or her information, this version of the design allows teachers to select the students from a drop-down

menu to see their information. This design's navigation also allowed teachers to review the summaries before sending them on to the student.

The new functions added to this version included a user management interface that allowed the administrator to view teacher and student profiles in a right-side pane when a record was selected. A window for adding users was added to the bottom of the page as well. Each user had a profile pop-up window that requested users to update their information each semester, making the profile information separate from the jury application information to allow a user to apply several times without having to enter in his or her profile information each time. Next to the student repertoire table, a key indicated how many songs of a certain language were required, and those numbers were matched against the number of songs currently existing in the student's repertoire. It is during this version of the design that a help page was introduced for the first time.

Version Four. The design of version four focused on the most efficient ways for users to know the tasks they needed to complete and where to go to accomplish them.

The revised functions of this version pertained to the user management interface. In the user management interface, an administrator could add a user to the database and view a user's information. These functions were united into one pane at the bottom of the page to maximize space so that an administrator could see more of each user's record without having to scroll over to the right. The user options and notifications in the upper right hand corner of the interface were organized so that the user could update his or her profile information by selecting the word "Edit" next to the user's name instead of having a link to their profile information on the menu bar.

The new functions of version four introduced an interface for teachers to be able to enter both their teacher scores for their private students in addition to their lab scores for their lab students on the same page, which eliminated blank space and simplified the menu bar. For this version of the design, notes were also added to tell programmers and graphic designers what each tab, button, text box, scroll-down, and checkbox should do. This version also included an interface in which to rate practice auditions separately from real auditions. Also, user notifications were listed in a drop-down menu from a notifications tab next to the user's name. On the student view past auditions page, students could see the names of the songs for which they were rated above the jury summary notes.

Version Five. Once revisions were made to make navigation more efficient, the focus of version five was to add notes to communicate with other team members—including programmers, subject matter experts, and other instructional designers—concerning the logic behind each part of the project. That way, we were able to maintain a consistent collective understanding of the project through the design and development phases and identify any holes in the logic.

Version Five updated the profile window to include the profile pictures of an actual administrator, teacher, and student in order to help a reader better understand the difference between the three roles and respective privileges. The add user pane of the user management interface consisted of one thin row of text boxes above the user table, and the rest of the page was open, allowing an administrator to see more records in one viewing. The notifications tab was changed to red in order to be more noticeable to the user. This version showed the minor differences between the practice jury rate auditions page and the actual rate auditions page. On the jury summary page, the algorithm for calculating the final grade is shown so the process is

more transparent for students looking at their scores. We aligned forms to the left to ensure that users would be able to fill out all of the required information without accidentally skipping over some text boxes. For viewing a student's past auditions, a student could now select a semester or a practice jury from a drop-down menu, and then a new tab would appear for each juror and/or jury summary included in the feedback for that audition. This allowed room on the left panel for a student to view which songs the juror and/or jury summary reported them as having sung during the audition. The help function in this newer design explained the functionalities specific to the page on which the help button was clicked, instead of having user-specific comments on anything in the help window; consequently, users would have faster access to useful help information needed at any given part of the feedback process.

Several new functions were also included in version five. More user management options were added to this version of the design, such as, "Proceed to next semester," "Set role to student," and "Set status to hold." The menu bars had simplified wording and options. Also, on the apply for an audition page, a student could upload all of the songs he or she had learned throughout the semester into a personal repertoire, and designate the songs to be considered in the jury by checking the corresponding checkbox to the left of the repertoire row. For viewing a student's past auditions, a student could select a semester or a practice jury from a drop-down menu and a new tab would appear for each juror and/or jury summary included in the feedback for that audition. This addition allowed room on the left panel for a student to view which songs the juror and/or jury summary reported them to have sung during the audition. This phase of the design also included a different window for a recital jury that allowed a student to enter songs in their repertoire from existing songs and to attach a PDF of their recital program for file storage.

Version Six. Version six of the project did not include any new functionality. The main purpose of this version was to make final revisions according to the feedback received from both the team and the client.

Revisions in version six included changes to the student view repertoire page. In this version, the design was changed to allow students to see the songs required for the lower-level requirements, the songs required for higher-level music classes, and also how many songs the student still needed to fulfill graduation requirements. That way, students could know exactly how many songs of each type were required of them, no matter what skill level they were in at the time.

User testing plan and results. Once the versions were refined, then to test the usability of the database, several focus groups were scheduled to discuss the design with individual vocal performance students and teachers. Students and teachers walked through each of the design pages and were asked concerning their thoughts and opinions of the design. Participant students and teachers used the tool on a volunteer basis with no other benefits.

From these usability tests, it was concluded that the design was fairly sound. Teachers and students understood the designs well enough to understand basic functions, and the database met most of their individual needs. Teachers suggested making the grading methodology more prominent and also making a few changes to the terminology of certain elements, such as modifying the type of song from “Other” to “Elective.” Students also gave helpful suggestions, such as the necessity of better expressing the repertoire and recital requirements within the database.

Design modifications. As part of the evolution of the project, there were two main areas of design modification: theoretic issues and practical issues.

Theoretic issues. At the outset of this project, I believed that the most important purpose of this product was to improve faculty productivity. Such a product would focus on immediacy of feedback. However, after conducting research and delving into this project, my beliefs have changed. I now think that the most important purpose of this project is to provide tools to facilitate the mentor relationship between the teacher and the student in the vocal performance program at BYU. This process involves not only automating the calculation of scores and keeping track of a student's progress through various semesters, but also focusing on including tips for providing and receiving meaningful feedback in the help section, encouraging students to discuss their results with their teachers, and allowing students to practice the jury process and work to improve in the given categories of performance criteria. This design facilitates that mentor relationship by providing easy-to-access records of feedback concerning students' performances to both teachers and students shortly after the actual performance.

Practical issues. Most of the practical issues around this project pertain to the interface in how users interact with the interface and in how to make each page more practical and usable. To resolve the practical issues, controls were changed from text-entry to drop-down menus, and the design was simplified to only the necessary functions of the first phase. During the simplification process, it became apparent how simple the entire feedback process of recording feedback and sending it to the student really could be. Additionally, other specific functionalities could be simplified, such as repertoire tracking, which helps teachers and students when referencing a student's progress measured against the required milestones for the program.

Maintainability and Sustainability

For a project of this size and scope, it was necessary to consider how the project would be maintained and sustained within the design. Without maintainability and sustainability, ownership of the project becomes confusing and the database becomes outdated.

Maintainability. Basic maintainability functions were built in to the database, such as user management and audition applications. Vocal performance administration will be primarily responsible for keeping the system up-to-date, though the use of the program itself will provide most of the necessary functions for such maintenance.

The CTL claims responsibility for maintaining the quality of the software and the web space reserved for the vocal performance database.

Sustainability. Once implemented, this tool will become an essential part of the vocal performance program. The design will provide means whereby vocal performance administration may synchronize the efforts of students and teachers of vocal performance classes each semester with the help of Blackboard and the current BYU Learning Management System. These elements will allow the program to be self-sustaining.

Production

Production occurred according to the following development steps: First, I prepared a thorough design document. This document served as the project proposal and expounded the goals, criteria, and expectations for the project. Next, I prototyped several interface designs. The designs were mentioned above in the section titled Design Versions (p. 20). After several review meetings with another instructional designer, graphic designer, and programmer, the design evolved into its final layout. When the design was complete, I worked with subject matter expert Arden Hopkin to select and finalize the design. While meeting with Hopkin, more

suggestions and revisions were made to make the document more appropriate for the teachers and students for whom the program was to be created. With the input of the artistic director of the CTL and faculty members and students from the vocal performance department, we selected VoiceTracks as the name of the vocal performance database. At the completion of the editing, I worked with a CTL programmer and a student employee programmer to develop the software. This is when the project design was reorganized from one project into three phases. Because of the simplification of the design into phases, the programming was not as demanding as originally expected, and we were able to have the test version ready for the juries at the end of April.

Implementation/Management Plan

Introducing a program like VoiceTracks requires forethought in the implementation process. One of the decisions made was to have the programmer manually add users into the database for the April juries in order to save time for the administrator, and also help teachers see the necessary information regarding each student.

Teachers and students were invited to attend focus groups to evaluate the design of the program and discuss functionalities during Winter semester 2010. Some of those same teachers and students participated in testing the resulting first phase of the database during the April juries. It was agreed that all of the teachers would arrive an hour prior to the set time to begin juries to receive a one-on-one explanation of how to use the database and to complete a mock jury before the juries began. To prevent any mishaps, teachers were asked to continue to record students' numerical scores on paper as a back-up record.

During the time of implementation, two programmers were on-site, as well as one other instructional designer, to ensure that everything went as smoothly as possible. Any necessary changes were made on-site if possible.

Evaluation Plan

In order to measure the effect of this project, it was important to have an evaluation plan within the design of the project. Conducting an evaluation provided insights and conclusions on the project.

Stakeholders. The stakeholders of this evaluation include Arden Hopkin, the Director of the BYU School of Music vocal performance Program; Larry Seawright, Co-Director of the BYU Center for Teaching and Learning; and all faculty members in the BYU vocal performance program interested in the results of the evaluation.

Potential conflict of interest. Many faculty and students were involved in the evaluation of the vocal performance database. Some of those individuals were previously exposed to the design and the goals of the project before participating in the evaluation. Those students may have had other expectations for the project that were not met or may not have given specific feedback because they felt their opinions had already been heard. In addition, I was both the main evaluator and the designer. This caused some repeated themes, such as timeliness of feedback, legibility, and value of feedback.

Evaluation objectives. The evaluation of the vocal performance database was determined on the following criteria: The degree to which using the vocal performance database during the juries allows professors more time by typing rather than writing their feedback, the degree to which using the vocal performance database minimizes time required to calculate and complete final scores, the degree of helpfulness at which vocal performance students rate the comments, and the degree to which professors and students prefer the virtual version of the vocal jury process to the traditional version.

Evaluation methods. The formative evaluation involved obtaining feedback through multiple focus groups composed of vocal performance faculty and students throughout the winter semester. Users were asked to comment on the database in terms of usability, functionality, implementation, and preferences. Notes from the discussion revealed student preferences such as a method to print out repertoire lists, a five-star rating system to rate songs according to how well the student liked to sing them, a symbol box to add accents to letters in their repertoires, and audio or video recording capability.

Participant consent. Participants consented to the terms of the project by agreeing to take the online survey.

Results of User Testing

This product was tested by four of the BYU music faculty and sixteen vocal performance students in the same level of progress within the program as part of the regular end-of-semester juries. The testing took place in the DeJong Concert Hall at Brigham Young University on the first reading day of finals week.

Implementation Results

Implementing a new system is always challenging and requires keeping the clients involved all along the design process so there are no surprises when the final version is implemented. For this project, planning the implementation was very important in making sure this program was used for its designed capacity.

Implementation history. On January 26, 2010, four months before testing, the BYU vocal performance faculty was able to see the design of the project for the first time. Arden Hopkin conducted the meeting and spoke excitedly concerning the need of the database. His comments helped the faculty feel the importance of this project even before the project was

presented. In this way, Hopkin modeled the use of technology to encourage other faculty members to use it. Studies have shown that technology leaders must model the use of the technology, articulate a vision for using the technology, and reward teachers as they strive to incorporate technology (Baylor & Ritchie, 2002). I felt that other teachers became more excited about the project because it was introduced by the director of the vocal performance division of the BYU School of Music rather than by me.

Over the next two months, I met with students to go over the design and resolve their concerns. Many realities of the original jury process were addressed during this phase of implementation, such as the differences between applying for a jury and applying for a recital.

At the completion of the first versions, two programmers, myself, and another instructional designer from the CTL, met with the music faculty members before the juries. With the help of the programmers and designers, faculty went through a mock jury simulation to become familiar with the buttons, process, and flow of the program.

Implementation observations. Because the database is internet-based, implementing this product required a lot of equipment including laptops, tables, and the internet. The tables were set up for teachers to use space on the stage to judge the students' performances, but there was no access to the internet on the stage so we had to take the tables and laptops to the back of the auditorium in order to access the database. Moving everything was a stressful process, and being so far from the performers was frustrating to faculty members who were accustomed to being able to see a student's facial expressions from a closer proximity.

The program itself had several quirks that were previously undiscovered. For example, the comment boxes did not automatically clear when teachers tried to enter comments for a different student. There were also functionalities not included in the program that the teachers

identified as necessary functions after testing the program. These functionalities included adding an automatic spell-checker for the comment boxes, incorporating an alert for any scores left blank at the time of submission, combining all teacher comments for one student into one e-mail, and minimizing clicks by having the program open to the juries scheduled for that day rather than having to select the date of the audition.

For future implementation, it would be better to walk the faculty through the whole process on a day prior to the actual trial. An earlier introduction would have set the teachers more at-ease with using the program and would have limited the surprises to the faculty concerning the tool. It also would have saved time had the problems with the internet been discovered before the day of the trial run.

The design goals were successfully accomplished during the implementation of the first phase. Teachers were able to record their comments faster and students were able to receive feedback within three days of the jury. Paperwork was minimized to the student's audition application and repertoire. Although the rate jury form itself was not on paper, as it was originally, teachers seemed to transition smoothly from the paper-based interface to the digital interface.

Evaluation

The evaluation of this project is a collection of personal insights, analysis of responses from online surveys, and a collection of the insights of those who were involved in the focus groups prior to the implementation of the project. During the usability test of the database at the April juries, CTL students and full-time employees helped faculty members record their remarks. For the internet survey, a link to the survey was e-mailed to students and faculty involved in the testing of this product. The data was then analyzed quantitatively using Qualtrics result

calculations of scalar data, as well as qualitatively reading over student responses to open-ended questions. The complete list of questions for the online survey can be found in Appendix C.

Evaluation history. The online survey was created near the beginning of this project. Although initially the emphasis was on improving efficiency through automating the calculation of grades and keeping track of jury records for BYU faculty, the evaluation was changed to focus on the legibility of comments, timeliness of feedback, and helpfulness of the feedback to students.

Following the Fall juries in December, the same set of questions was sent to students and faculty to assess the existing traditional system against the same criteria. Comparing these surveys makes the influence of the database noticeable and measurable.

Evaluation conclusions. From the results of the survey, we learned several things about the vocal performance students' experiences using VoiceTracks in juries. First, using VoiceTracks provided students with more legible feedback. During the design process, many students had expressed frustration with the illegibility of teacher comments. In the survey, when asked how true the statement "My feedback was legible" was, students rated Voice Tracks at 4.43 out of 5. When asked what they liked about their jury experience, one student wrote, "The feedback was not handwritten- I could almost never discern the adjudicators' remarks before, which was very frustrating" (Student Evaluation comment, April 2010).

Second, using VoiceTracks made students feel they had easier access to meaningful feedback. Although VoiceTracks feedback itself was not significantly more meaningful than handwritten feedback, students felt like they had better access to meaningful feedback because the results were e-mailed to them.

Finally, using VoiceTracks provided students with faster feedback. In the survey, students rated timeliness of feedback with VoiceTracks at 4.78 out of 5. Most students had already received their jury scores at the time of taking the survey just one week after the jury.

From the survey responses gathered from the participating faculty members, we also learned several things about the system. First, teachers felt they could say more in the comment sections using their computers. When asked what they liked about their jury experience, one teacher wrote, “The ease, and clarity, of written comments improved my experience. My handwriting is slow and labored. I could say much more with my computer” (Teacher Evaluation form, April 2010).

Second, using VoiceTracks allowed teachers to be more confident that their feedback was legible. Overall, teachers knew that students would be able to read their typed comments, whereas they could not guarantee that a student could read their handwriting.

Third, according to the data, the feedback provided by the teachers was not measurably more meaningful. Teachers felt their feedback was just as meaningful as it was when it was handwritten.

Finally, VoiceTracks allowed teachers to complete and share feedback from performances with students sooner. Just two days following the juries, half of the participating teachers had returned jury feedback to their students.

Overall, in comparing the scores from the control group with the scores from the VoiceTracks group, the vocal performance database seemed to most improve legibility, followed by the timeliness of feedback, and a very minor improvement in the value of feedback given.

Adjustments. In the survey results, teachers and students provided recommendations for improving the current product in the future. Concerning the rate audition page, teachers

suggested having the date of the juries default to the current date. They also suggested that the score default to blank, not to zero, when a new student's record is displayed. One teacher suggested changing the increment buttons next to the scores change to a combo box for faster entry. Several teachers also requested an undo button, or some way to fix a score that was falsely submitted. In the future, these suggestions can easily be implemented into the program.

Most students desired more feedback from teachers. This means that not all teachers were using the space provided for giving as much feedback as they could. As discussed earlier, something could be added to the help section to encourage teachers to give the most meaningful feedback.

Design Results

From the experience of leading a design process and collaborating with specialists to maximize the value of feedback, several conclusions were drawn. The following conclusions are based on both the data from the survey questions and observations from my overall design experience.

Theoretical insights. At the outset, this project was based on the design goal of simplifying the jury process to make feedback more quickly available to students. The principle driving the project was mostly usability, exploring how using a database would save so much time and paperwork. Since beginning this project, I have found that this project has significant impact to instructional theories in vocal performance and also in education as a whole.

This project was one of the first to attempt to use computers to record comments and scores during a vocal performance jury. When I discovered that most universities use a paper and pen system, I actually became skeptical of the idea and wondered what its value would be. Using a laptop to record scores and comments is a new idea for vocal performance juries, and as

such, this design became a test of the theory of computer-aided music instruction—how would the creation and distribution of digital information, rather than paper information, be beneficial to music educators? Especially in the United States, where music education has been taught according to strict traditions, could the transition from a file cabinet to a database happen effectively for the music field? I believe this project proves that yes, it can. Although it may be different for teachers to use laptops rather than papers and pens, I think there are some definite advantages to using computers to store information, including the increase of organization for the teacher and the speed at which students receive feedback from their vocal assessments.

Generally, the world of education is undergoing dramatic changes through technology. This project offers yet another example of the potential of technology for improving instruction, specifically performance assessment, by providing more immediate feedback, and facilitating easier storing and commenting of student vocal juries.

Modification of product. The biggest change in this project occurred when the project was redesigned into separate phases. Before that revision there were too many possibilities. The product was constantly growing in possible functions and designs. But when the main project goals were reviewed and the focus simplified to the timeliness of feedback and minimizing paperwork, the design and even the interface became quite simple. Having scores and comments e-mailed to the student gave students easy, quick access, while negating the need for a student interface for the database and drastically cutting production time. The product, in its essence, is a simple database with three different interface screens. I think the simplicity of this design is one of the major factors that made the first phase of the project successful.

Because of the usefulness of tracking scores and repertoires through time, future phases of the product will bring an increase in complexity, which will also bring an increase in

functionality that will be very helpful especially for the BYU vocal performance program. Even though in the long term this product will allow students to better understand their overall progress through the vocal performance program, it will also add some complexity and additional learning for new users.

Process insights. The process from analysis to evaluation of this phase of the project naturally evolved over time. At the outset, there was intended to be a lot more design planning before creating a prototype, but in practice, each team member was more productive as he or she had some task to accomplish on completing a prototype of the design. Whether it was storyboards, programming, artistic rendering, or editing, productivity was higher when each person was actively creating rather than thinking or discussing. Thus the design document turned into a series of detailed storyboards and multiple prototypes of the program itself. Having prototypes allowed our team to move forward with development quickly and having a prototype to critique allowed our team to envision and thoroughly assess the project in its current state.

The process was also more effective as we communicated regularly. There were times when I felt like I had to wait on a part of a project in order for the project to get done, and then I would find out that there had been a miscommunication and all that time I had spent waiting, another team member had spent waiting on me. Consistent and persistent communication is essential for the success of a project, especially one the size of the creation of the vocal performance database.

Assessing the traditional jury process before implementing the new process provided some data against which to test the end result of the project. In this case, comparing the pre-assessment of timeliness, value, and legibility of teacher feedback against the same criteria after the database was implemented allowed us to see the value of this project in a measurable way.

Conclusion

The process of digitizing a traditionally handwritten procedure required an understanding of the BYU vocal performance program, the existing jury method, and the purpose of the jury. As the other phases of this project are developed, this online database will allow students to measure their progress over their entire participation in the vocal performance program at BYU. Faculty members will be better able to understand the progress and needs of individuals, and students will be better prepared with the feedback they need to succeed in the vocal performance program at BYU and in their future performance careers.

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Appendix A

Example of Storyboard and Artistic Design

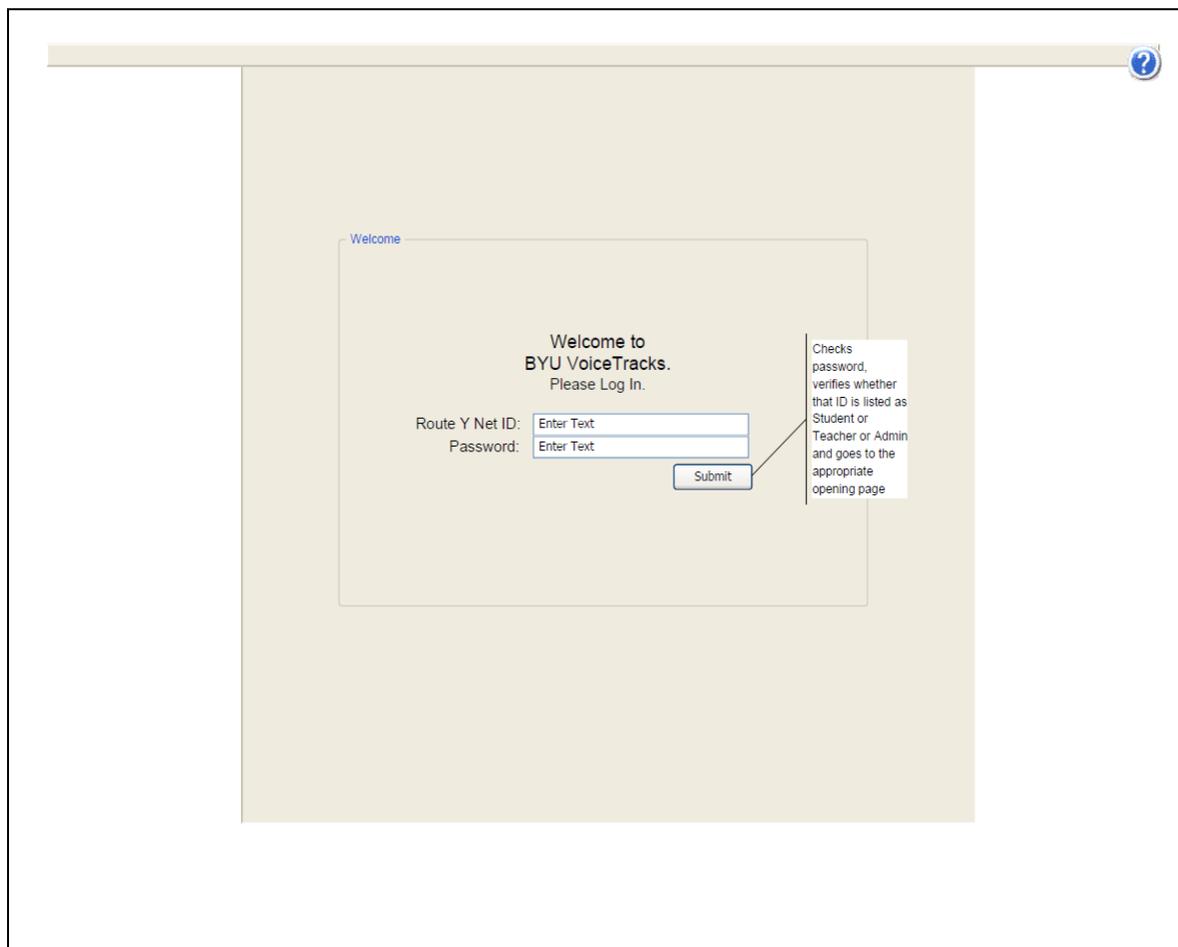


Figure A1. Screenshot of the Login Screen of the storyboard for the final design.

Vocal Performance Database Hopkin, Arden (Edit) | Notifications (5) | Logout | ?

Rate Auditions | Teacher/Lab Scores | Jury Summaries | Database Users

Checks all checkboxes **Students** Teachers

Performs selected action

Last Name:* First Name:* BYU NetID:* Role:* Status: Teacher: Lab: Course: Date:

Enter Text Enter Text

Select All Actions... Go View: All Selected

	Last Name	First Name	BYU Net ID	Role	Teacher	Lab	Course	Date
<input type="checkbox"/>	Chapman	Jana	jchapman	student				
<input type="checkbox"/>								
<input type="checkbox"/>								
<input type="checkbox"/>								
<input type="checkbox"/>								
<input type="checkbox"/>								
<input type="checkbox"/>								
<input type="checkbox"/>								
<input type="checkbox"/>								

Also for first login, once the admin profile pop-up goes away, the admin should manage users.

Figure A2. An example of the student tab within the user management section of the storyboard design.

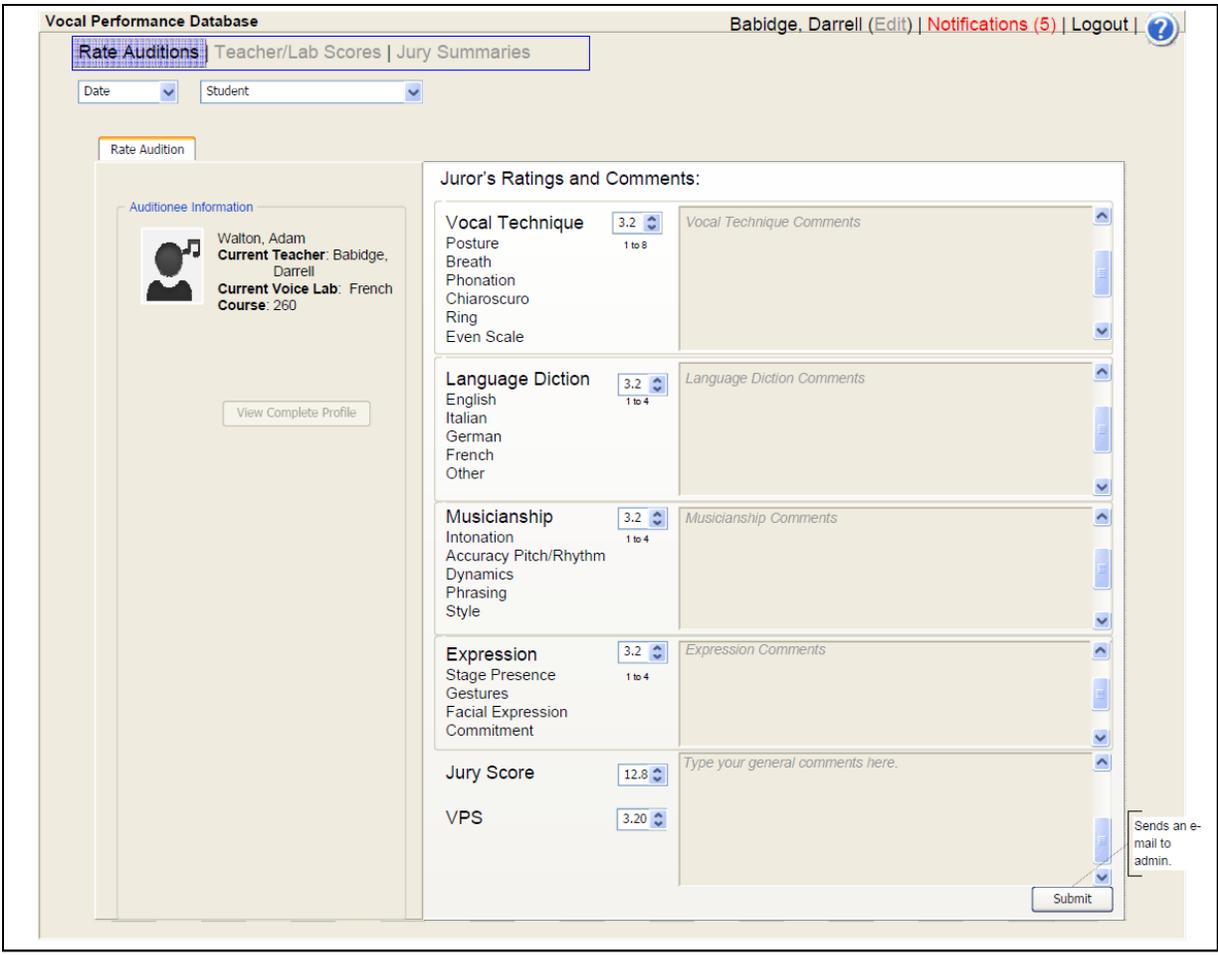


Figure A3. Storyboard of the rate auditions section of the design.

Subject: Vocal Performance Jury Results

Student: Walton, Adam
Teacher: Hopkin, Arden
Juror: Babbidge, Drew

Juror's Ratings and Comments:

Vocal Technique <input type="text" value="3.2"/> 1 to 8 Posture Breath Phonation Chiaroscuro Ring Even Scale	<i>Vocal Technique Comments</i> <input type="text"/>
Language Diction <input type="text" value="3.2"/> 1 to 4 English Italian German French Other	<i>Language Diction Comments</i> <input type="text"/>
Musicianship <input type="text" value="3.2"/> 1 to 4 Intonation Accuracy Pitch/Rhythm Dynamics Phrasing Style	<i>Musicianship Comments</i> <input type="text"/>
Expression <input type="text" value="3.2"/> 1 to 4 Stage Presence Gestures Facial Expression Commitment	<i>Expression Comments</i> <input type="text"/>
Jury Score <input type="text" value="12.8"/> VPS <input type="text" value="3.20"/>	<i>Type your general comments here.</i> <input type="text"/>

This is what the e-mail needs to have. After looking it over, the Admin will then forward the e-mail to the teacher, who will then forward the e-mail to the student.

Figure A4. The storyboard for the feedback e-mail that was included in the final design.

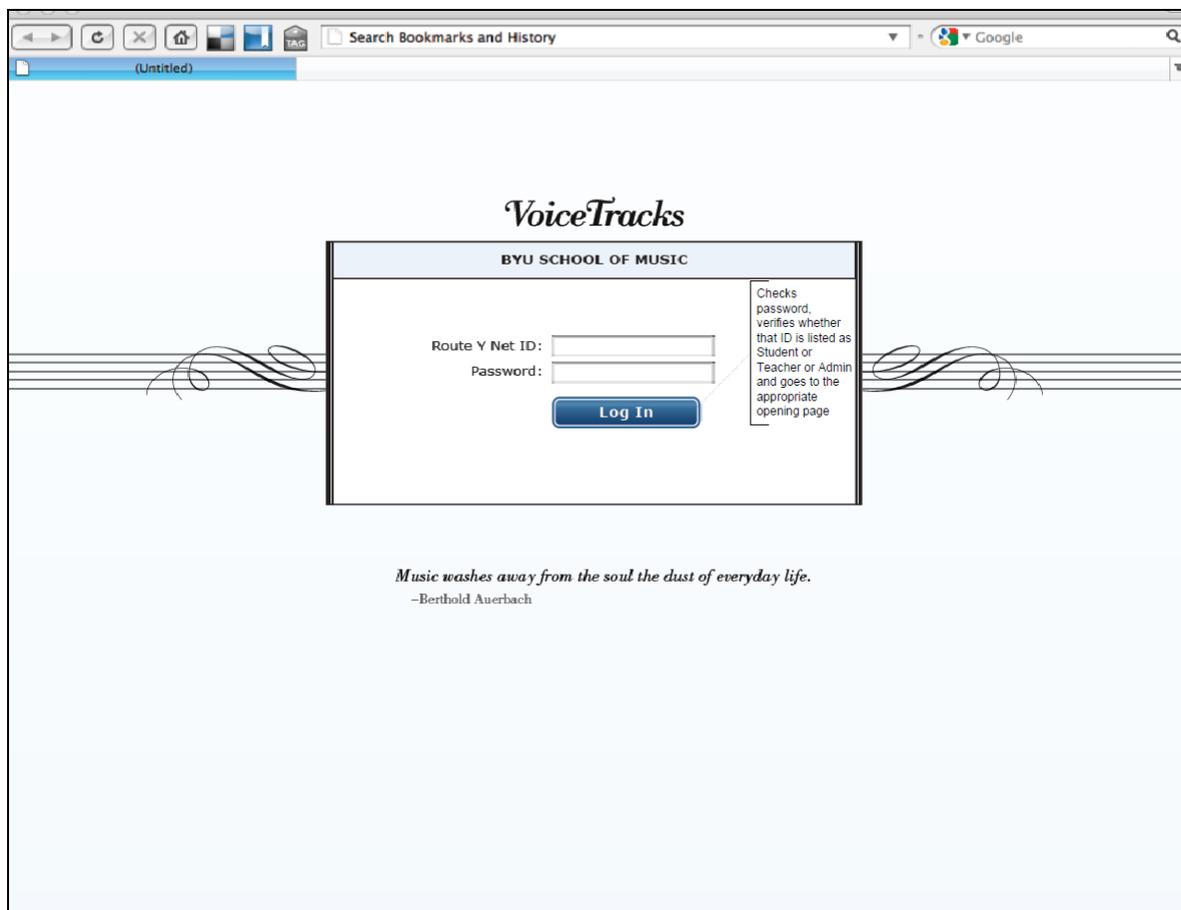


Figure A5. The artistic rendering of the login screen.

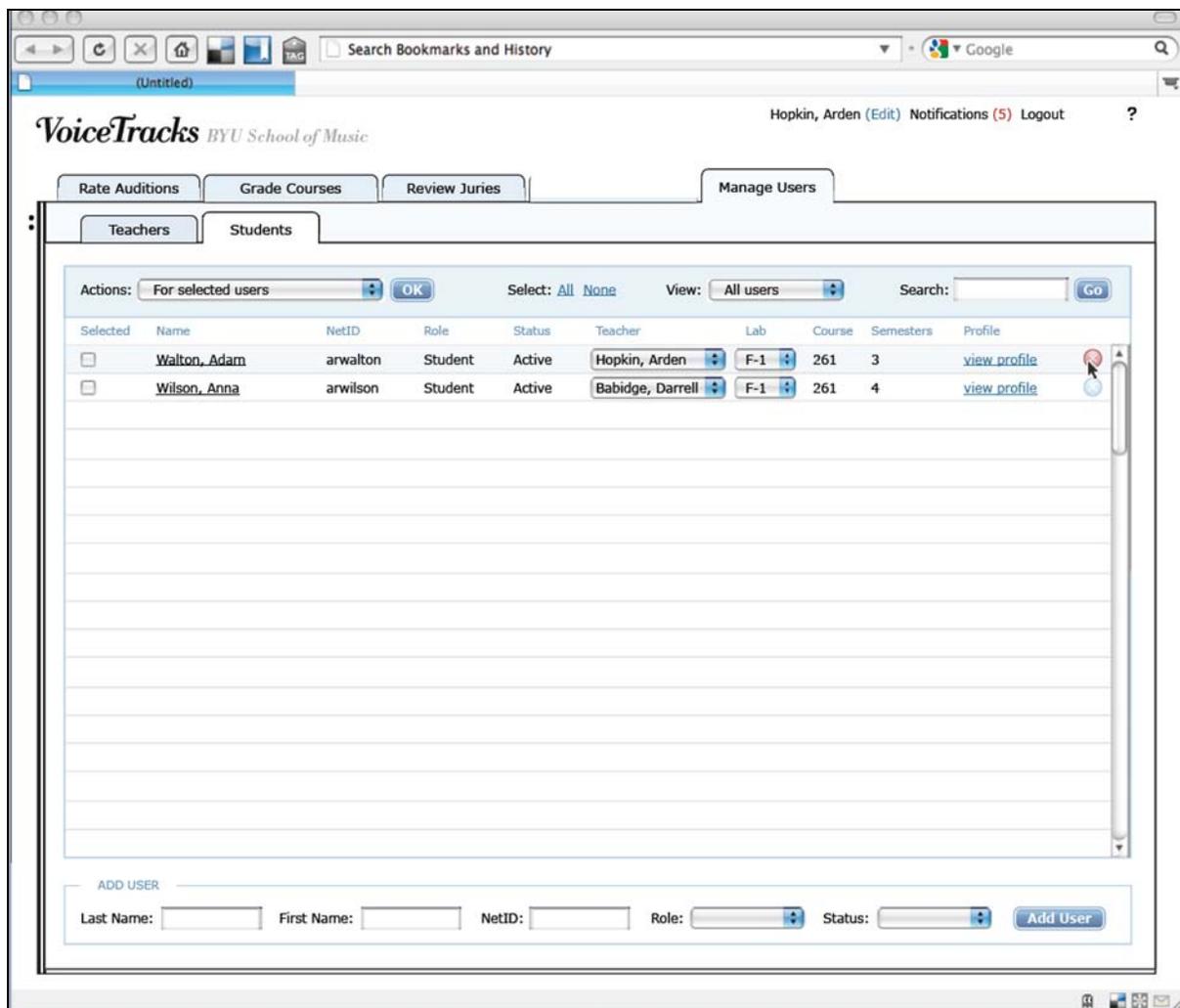


Figure A6. The artistic rendering of the student tab in the user management portion of the final design.

VoiceTracks *BYU School of Music* Babidge, Darrell (Edit) Notifications (5) Logout ?

Rate Auditions Grade Courses Review Juries

Friday, 14 May 2010 Adam Walton Semester Proficiency Audition / 360R

Rate Audition Repertoire Past Auditions

STUDENT PROFILE
Adam Walton
 Major: Vocal Performance
 Teacher: Hopkin, Arden
 Voice Lab: German
 Standing in Voice: 161
[View Complete Profile](#)

AUDITION REPERTOIRE

Sung	Title (Composer)	Duration
<input type="checkbox"/>	Stairway to Heaven (Led Zeppelin)	7:43
<input type="checkbox"/>	Black Magic Woman (Santana)	4:11
<input type="checkbox"/>	Carry On Wayward Son (Kansas)	3:52
<input type="checkbox"/>	Purple Haze (Jimi Hendrix)	3:28

RATINGS & COMMENTS

Vocal Technique 1 to 8
 Posture, Breath, Phonation, Chiaroscuro, Ring, Even Scale
[Vocal Technique Comments](#)

Language Diction 1 to 4
 English, Italian, German, French, Other
[Language Diction Comments](#)

Musicianship 1 to 4
 Accuracy Pitch/Rhythm, Harmonization Intonation, Dynamics, Phrasing, Style
[Musicianship Comments](#)

Expression 1 to 4
 Stage Presence, Gestures, Facial Expression, Commitment
[Expression Comments](#)

Jury Score **17.7**
VPS 0 to 5
[General Comments](#)

Releases comments to the Administrator for Review

[Cancel](#) [Submit](#)

Figure A7. The artistic rendering of the rate audition page of the design.

Appendix B

Example of Student Surface e-mail

Subject: Voice Tracks Rating Report

Juror: [REDACTED]
 Juror's Email Address: [REDACTED]

Here is the rating report for [REDACTED] (net id: [REDACTED] from jury member [REDACTED]. Forward to [REDACTED]'s teacher [REDACTED]. If you are this student's teacher, forward this email to the student.

Vocal Technique Score: 7
 Vocal Technique Comments: Lovely, consistent chiaroscuro in voi che sapete! Good projection; healthy production. Lovely movement into the low range!

Language Diction Score: 2.5
 Language Comments: Good Italian diction combined with language inflections. Good for you! Consonant energy in English is weak in the large hall.

Musicianship Score: 3
 Musicianship Comments: You sing accurately and with the beginning of phrasing, dynamics and style. Keep working here.

Expression Score: 2
 Expression Comments: Your voice carries a great deal of expression in it, but your body movements are too subtle to carry over space.

Jury Score: 14.5
 VPS: 2.8

General Comments: You have greeat potential as a singer that I hope you will take seriously.

Figure B1. An example of an e-mail with scores and comments sent to the student following the April juries.

Appendix C

Evaluation Questions

To Students

On a scale of 1-7, how true are the following statements for you concerning your most recent jury experience:

1. I made eye contact with each of the jurors at some point during the jury.
2. I have already received the feedback from my jury.
3. The feedback I received was legible.
4. The feedback I received was helpful.
5. The feedback I received was given in a timely manner.
6. I feel like I have easy access to meaningful feedback on my jury.
7. I feel like I have easy access to meaningful feedback on my progress within the vocal performance program.
8. I preferred using the vocal performance Database to the previous paper-based system.

Please answer the following questions:

9. What did you like about your jury experience?
10. What suggestions do you have to improve or to use the jury experience?

To Teachers

On a scale of 1-7, how true are the following statements for you concerning your most recent jury experience:

1. I made eye contact with each of the students at some point during the jury.
2. I felt rushed to write my remarks in the allotted time during the jury.
3. I have already completed writing all of my remarks for the jury.
4. I have already returned jury feedback to each of my students.
5. The feedback I gave was legible.
6. The feedback I gave was meaningful to the student.
7. The feedback I gave was given in a timely manner.
8. I feel like I am able to give my students easy access to meaningful feedback on their juries.
9. I feel like I am able to give my students easy access to meaningful feedback on their progress within the vocal performance program.
10. I preferred using the vocal performance Database to the previous paper-based system.

Please answer the following questions:

11. What did you like about your jury experience?
12. What suggestions do you have to improve or to use the jury experience?