Voxspell - Spelling Aid

Evaluation Report

Kevin Daniel Hira
Department of Electrical and Computer Engineering
The University of Auckland
Auckland, New Zealand
khir664@aucklanduni.ac.nz

Voxspell is a spelling aid designed to help people improve their spelling. The intended audience for Voxspell is 18-25-year-old English as Second Language users. Design aspects and decisions of this application are discussed, as well as an evaluation on the effectiveness of these decisions in meeting the needs of the second language users.

I. Introduction

Voxspell is a spelling aid that helps users improve on their spelling abilities. It is an application which allows users to take quizzes and test their spelling knowledge on certain topics of words. Users can take tests of length between 3 and 30 words gets real-time feedback on how well they are doing as they answer the quiz such as an accuracy reading. After a user finishes a quiz, they can view their results, and if they do exceptionally well (over 80%) then they can view a special video reward congratulating them. In addition to taking quizzes, users of Voxspell can change the topic freely at the main menu, and also view statistics on all words they have spelt before and past quiz results. Because every person has different preferences regarding hearing, the settings menu gives the user the ability to switch text-to-speech voices, as well as other aspects such as how many words should be in each quiz and if they would like to mute the menu background music. If the user wants to be tested on a special set of words, they can opt into adding their own wordlist into the application also.

The target user audience for Voxspell is for the English as second language demographic. This demographic consists of 18 to 25-year-old individuals who wants or needs to learn English as an additional language over their natural tongue. These users will want to use Voxspell for educational purposes and this influenced the design of the application. Because of this professionalism, Voxspell has been designed to be very clean and easy to read as this is more important than an artistic design.

II. Graphical User Interface Design

The final Voxspell graphical user interface was designed and developed using Java and JavaFX framework, where FXML was also used to set up the design for the graphical user interface. Earlier iterations of Voxspell however was built using Java's Swing window building framework. The reason for this design decision to switch frameworks and build up the graphical user interface again was because Swing is not as flexible and reusable as JavaFX and as more intricate features were to be implemented, Swing would have become an increasingly inviable solution in relation to JavaFX. This was a good choice overall, as it provided many powerful features that made it easier to develop Voxspell. The SceneBuilder application helped create the graphical user interface without having to consider too much about the code which was written, as SceneBuilder generated code to match what was laid out in the builder.

The graphical user interface as a whole is very simplistic. It was designed to be so because the paramount intention of Voxspell is to be a professional tool to help educate people in the language of English. The colour that was used is straightforward so that the users of Voxspell are not distracted away from perceiving it as an educational tool. A Minimal blue scheme is used throughout, where the background is a middle to pale blue, and the controls are a deep blue.

Fig. 1. Title menu that is shown on launch.

These colours are not visually harming, they will not hurt the user's eyes, and together give an effective finish to the Voxspell application. In addition, the colour scheme is through to be culturally neutral. This is important as second language users will most likely come from many diverse cultural backgrounds. These cultures may have colours associated with them that are portrayed in a negative (or positive) light which could affect users' ability to use the application.

The layout of the graphical user interface for Voxspell is very linear and flowing. Buttons and other controls line up where it seems appropriate, and this makes it easier for the user to navigate around Voxspell without confusion. Because this application is designed to be a professional education tool, controls were placed carefully and only were absolutely needed. This is so that the application is easy and clear to operate, and high usability is achieved. This is why the layout of the graphical user interface is not gamified: if the interface was gamified, then it would not suit the professional education intention of the application. The users are not overwhelmed by controls and hence will be more comfortable in using Voxspell.

Voxspell is not a very big application with regards to screen size. It has been designed like this because of its lightweight nature. The application isn't too small that elements are hard to read, but it is also not too big that there is a lot of unutilised space.

Another design decision was to add help messages to all of the major buttons and controls. This was in the form of "tooltips" which are balloons of text that pop up when the user hovers over a control. This was done so that the user has more information about what each control is doing or will do and acts like an extra layer of help in explaining the different features of Voxspell. This is particular important with English as second language users as if there are some words they don't understand which are presented in control texts, then a little sentence rewording these might be useful for the user's understanding of the features.

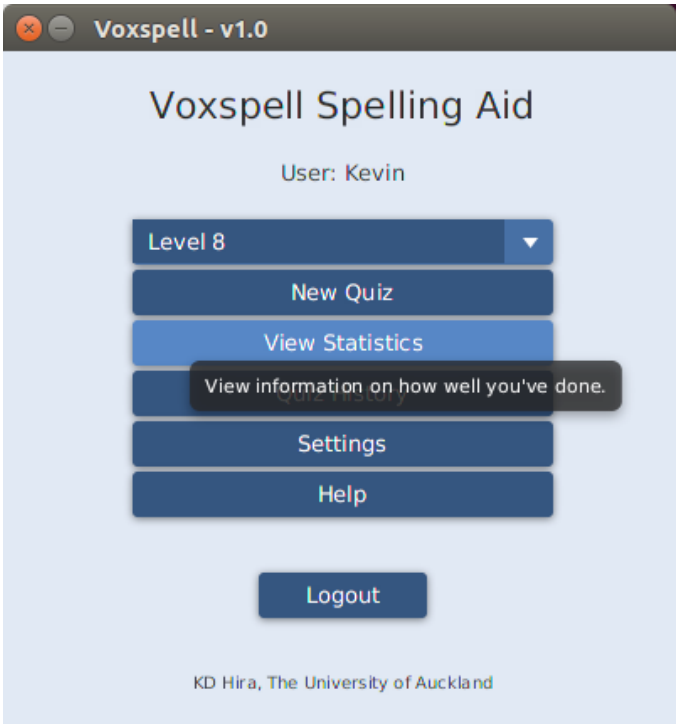

Fig. 2. Main menu with tooltip shown on View Statistics button.

III. Functional Design

Voxspell, at its core, is a spelling aid with the purpose of teaching English as second language users more about spelling. There are, however, additional features to Voxspell which makes the spelling and learning process more informative.

A. User interaction

The application was designed with the idea that multiple users may want to learn and use the spelling aid. The Voxspell application has multi-user functionality where more than one person can have their statistics saved.

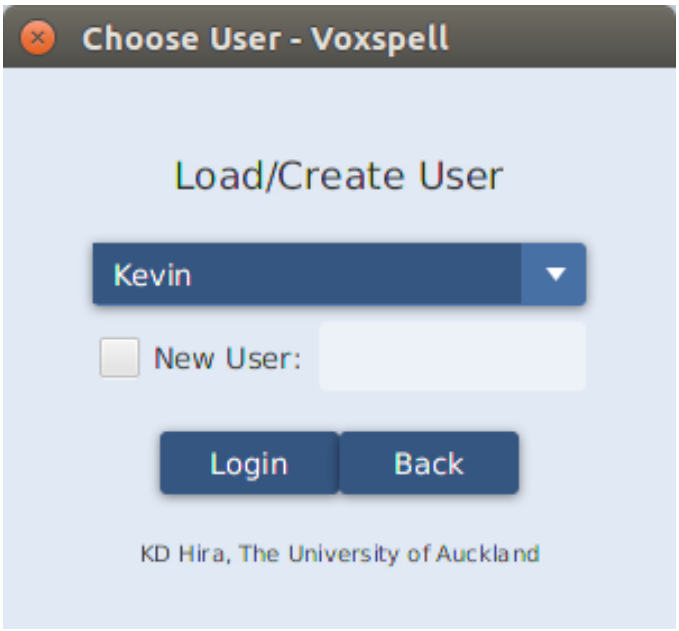

Fig. 3. User select menu, where the user can select am existing user or create a new one.

The use of passwords is omitted as this application does not store any sensitive data, and the aspect of security in this case is not relevant when it comes to providing an application that simply helps its users spell.

As well as being a multi-user application, a user of Voxspell can also choose to add many word lists to use for spelling. The default word list encapsulates some of the common words that people spell wrong, but often people would like to practice and be tested on other words that all share common themes.

Fig. 4. Word list select menu, where the user can select an already imported word list or import their own.

Users can hence practice words from topics that they want in the case that there are circumstances that second languages users might need to concentrate their spelling on certain themes of words.

The main menu also has a background soundtrack. This music was added and intended on being calming to the user while they navigate the menus. The music stops when the user enters a quiz, as otherwise the background music will be distracting as it overlaps with the speech synthesiser.

B. Quizzes

The purpose of Voxspell's quiz feature is to help users spell words, but also to give useful feedback.

The quiz menu contains a text component that builds and shows feedback as the user progresses through a quiz. This component shows each of the words that the user has just answered, and how they answered it (whether they got it right or wrong). It also shows the number of words and where the user is up to at any one point so the user is not confused about where they are at in the quiz.

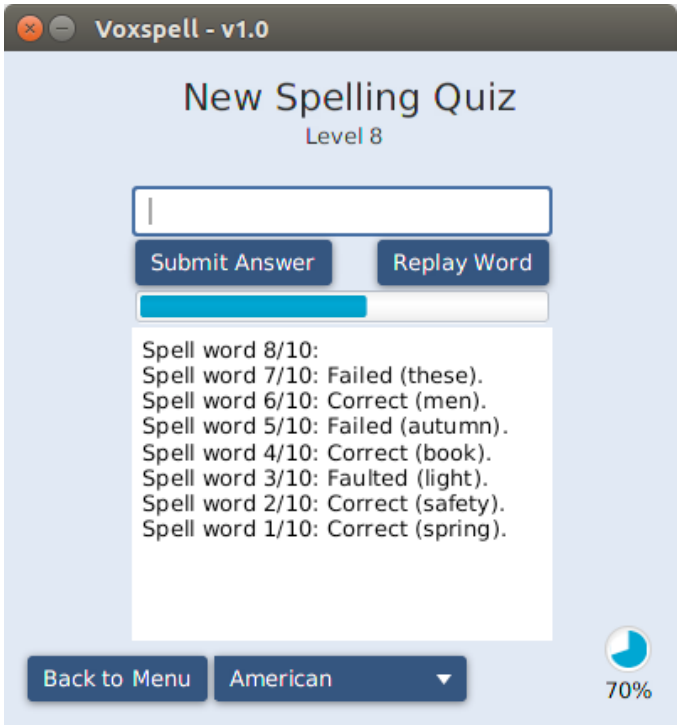

Fig. 5. The quiz interface, where the large text flow shows the status of the quiz, and updates as the user progresses..

In addition to displaying feedback, Voxspell gives the ability to replay and listen to words multiple times. At no extra cost to the user, they are able to hear the word more clearly (Voxspell slows down the pronunciation on extra plays of the word) which will help them comprehend words that might be hard to hear. This may be due to the length of word hindering its pronunciation or because the syllables are hard to generate correctly for a speech synthesiser.

Because speech synthesis is imperfect, some words can be hard to understand when a synthesiser says them. This is one

reason why there is the ability to temporarily change the text-to-speech voice from within a quiz (the user can permanently change the voice from within the settings menu). If the user cannot hear what is being said, they can change the voice and replay the word, with the hope that it is said differently, and hence more comprehendible.

C. *Displaying of Results and Feedback*

Because Voxspell is intended for English as second language users, who will use this application for educational purposes, it is important that it gives meaningful and useful feedback and results to the user when necessary.

One way that this is done, is by the results menu that the user interacts with after completing a quiz. This results menu contains a pie chart of the proportions of words that the user has mastered (correct on first try), faulted (correct on second try) and failed (incorrect after two tries). This is done because showing the user the proportions of words they have got correct visually will help them understand how well they've done. In addition, the results menu also reports back an accuracy statistic which tells the user how many words they mastered in that quiz. The decision was made to add this in as it was believed to add to the usefulness of the feedback the user would get after the quiz ended.

If the user does exceptionally well, they will be offered the chance to view a reward video. This bonus is only available if the user scores more than 80% accuracy in a quiz. The idea behind this is that the reward video acts like a small motivator for the user to do well and aim for good accuracy in answering correctly on first tries.

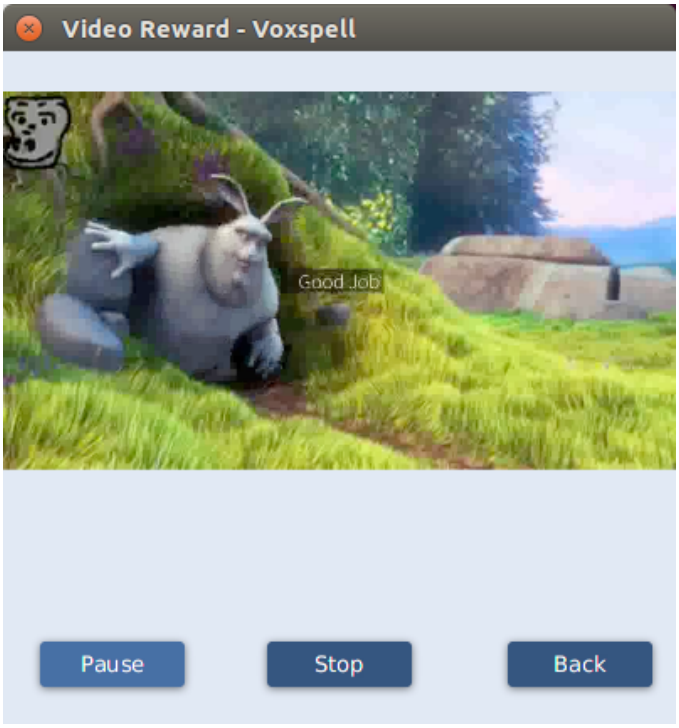

Fig. 6. Rewards menu, showing the royalty-free video.

As well as providing feedback after quizzes, Voxspell also logs these quizzes and produces overall statistics for each topic the user has attempted. These function has been implemented so that the user can go back at any time and review how they have been progressing. This is important as users can get a grasp on where their strengths are, as well as areas where they might need more assistance or practice. This is reflected in the statistics menu, where words that have been attempted are shown on a topic-by-topic basis and totals of mastery, faults and fails are shown.

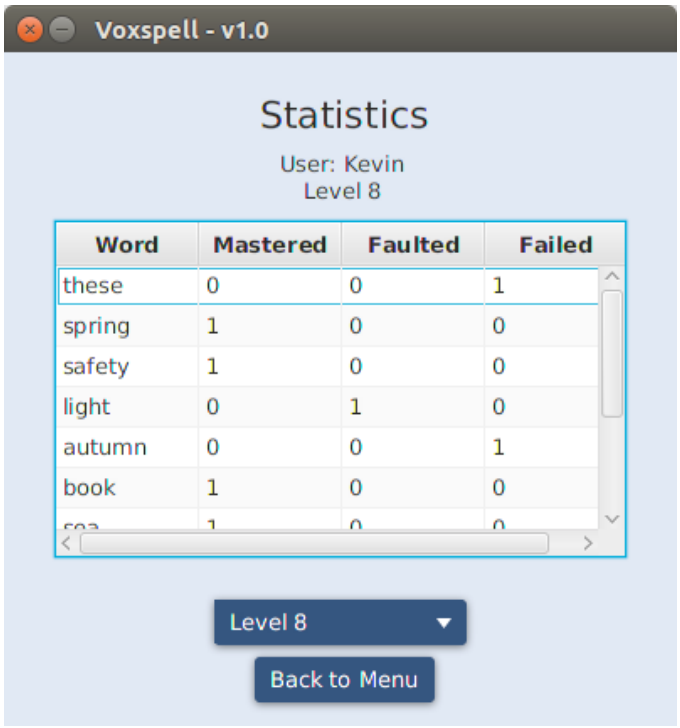

Fig. 7. Statisitcs menu, where the user can look over all words they have attempted so far.

Also, the quiz history menu (which is unlocked after the user has completed at least one quiz) shows the results of any quiz previously attempted. The pie chart proportions and accuracy readings are visible for all quizzes the user has attempted here.

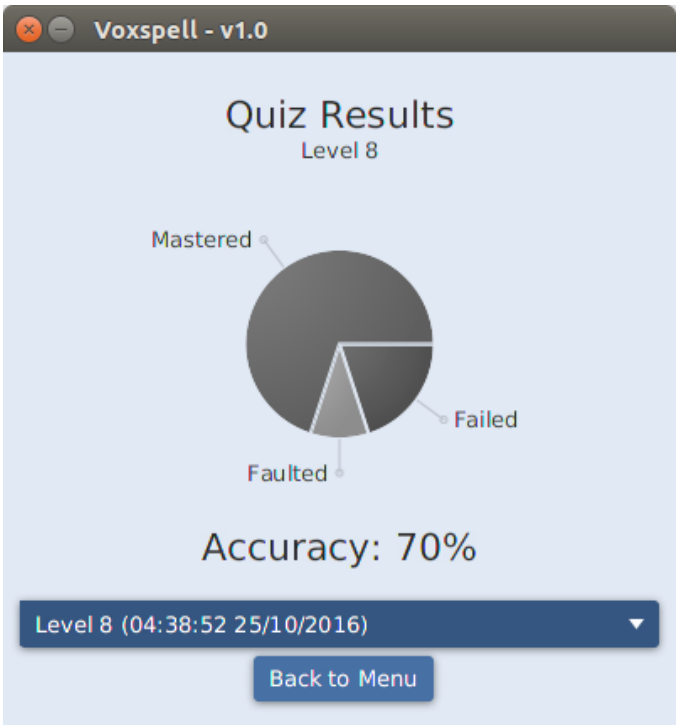

Fig. 8. Quiz history menu, where users can look back over any past quiz they took.

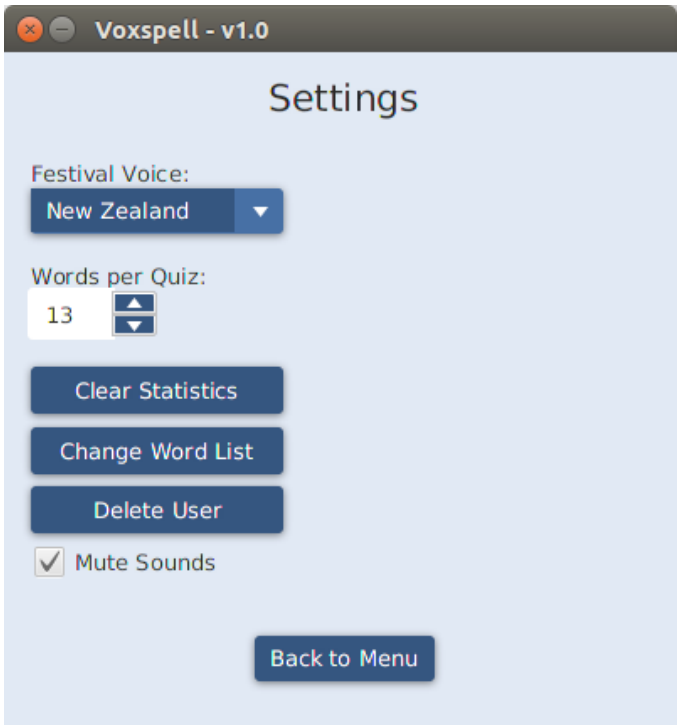

Fig. 9. Settings menu. Users can change various aspects of Voxspell here.

D. *Customisation and Usability*

It is important for an application to be able to be tailored to a user to improve their experience where possible. Voxspell provides opportunities to do this.

Many of the menus have buttons which have shortcuts. This is so that the user can quicken the navigation of the graphical user interface. These buttons have the "enter: key as its shortcut so that when the user presses enter on menus like dialogs and alerts, they can move right along to the next. This is also the case with cancel-like buttons and the escape key.

Voxspell has the ability to change the topic that the user will be tested on right in the main menu. This control is in an obvious place so that it is easily accessible and changeable and users can swap between topics without hassle.

The main source of customisability of Voxspell exists within the settings menu. The decision was made to create an entire menu for settings because it gives a definitive place the user can go to change various features of Voxspell, instead of these customisable aspects being scattered throughout the application's interface.

The settings menu is the centre of customisation for Voxspell. The user is able to select their preferred speech synthesiser voice (out of the American English or New Zealand English voices). They are also allowed to change how many words they would prefer to have in a quiz. They can have any number between three and 30 inclusive. The user can clear their statistics, change the word list and mute the menu background sounds if they so desire. And if the user is finished with using Voxspell entirely, they can opt into deleting their user account.

Voxspell also has a help option in the main menu, where if users click this option, they will be greeted with the user manual for the application. This was done because it is important for the user to have some way of find out more about how to use the application, in the case that the tooltips are not enough help.

IV. Code Design and Development

A. *Software Choices*

Voxspell was designed using the Java programming language. This language is quite versatile and powerful. Java was a good choice for this project, but maybe not the best alternative. There are some aspects of Java and JavaFX that proved to be problematic, such as in some instances stylising and dealing with the graphical user interface could have been better. However, with the standard Java Development Kit (8), which included JavaFX, and with the festival libraries for text syntheses, no other libraries were needed to create this spelling aid application.

B. Developmental Process

An agile-like software development process was incorporated when developing Voxspell. Git was used to maintain version control. An open source text editor, Atom, was used for primary software development. With this, SceneBuilder, a graphical user interface generator, used to help construct the user interface. Small (but sometimes decently size) iterations of Voxspell were committed based on the feedback from the clients and peers.

C. Development Issues

While not using an integrated development environment has its advantages, there were many drawbacks. One example of such a drawback is the Java documentation for many classes had to be read extensively to find the appropriate usage of classes before they could be implemented as there is no code completion. Also build and execution of code required the use of terminal rather than using the development suite that would have been used otherwise to compile and test Voxspell. However, these points also proved to be good lessons, as vast knowledge about Java and the Java documentation and the use of bash and terminal was learnt.

V. Evaluation and Testing

A. Self-Reflection

Throughout the life of the Voxspell application, frequent testing was performed. Over the iterations of Voxspell (from previous assignments) I feel that it has evolved into something quite professional. Adding the feedback features and the ability to customise aspects such as the words per quiz makes the application quite useful and educational for second language users.

Other Voxspell implementations have more interesting features in attempts to gamify the application. There were many design ideas that came to mind when developing Voxspell, but they would all take away from the professionalism that I was intending the application to be for the second language learners, so I couldn't implement them. Such things would have included moving components, a more gamified scoring system and more vibrant colour scheme for the graphical user interface.

B. Effects of Peer Evaluations

From the peer evaluations that were done on my application, there were a few stand-out points. There were some features, like the ability to clear statistics and have video rewards, that I had not implemented. Since these peer review these have all been implemented into Voxspell. Many of the peer reviewers like the flow of the application and how smooth it was to use, and since then I have tried to still improve on this. Some feedback which I did not choose to act on were more graphical user interface issues. The size of my application was criticised, but I have chosen not to make it bigger because of how the components will look with large spaces between was undesirable. I also got feedback about my application not being gamified, and this was obviously the case because I was going for a very professional look for the second language users, so I did not act on that advice as well.

Other changes that were made irrelevant to peer reviews, however, include adding a colour scheme, and expanding on the results feedback with the results menu, showing a pie chart graph. I also rearranged components and features to make the application flow better.

VI. Future Improvements

There are future improvements that could be applied to make Voxspell a better spelling aid for second language users. A feature that was being worked on but could not be completed due to scope creep was supporting multiple languages. Ideally, the user could select their native language and the button and labels will be translated to their language so that they can navigate the application even easier. This would leave only the quiz itself being in English. Another improvement that could be made is further developing the results feedback from quizzes, and adding in the words that were used in the quiz and user's outcome for each. This would give the user a better breakdown on how well they did in a quiz.

VII. Conclusion

Voxspell was a spelling aid designed for the English as second language demographic which include people who were between 18 and 25 years old and want or need to learn English as their second language. Many design ideas were considered during the development of the application, and overall this application was designed to be simple, elegant and professional, and give users a good chance to learn English through this spelling aid.

VIII. Acknowledgments

I would like to acknowledge Josh Cleland for his efforts in collaborating with me in an earlier iteration of Voxspell.

IX. References

Music used in the main menu: Julie Maxwell's Piano Music, "Mars Landscape: Sun Set", acquired from http://freemusicarchive.org/music/Julie_Maxwells_Piano_Music/Farther_Than_All_The_Stars/Julie_Maxwells_piano_music_-_Farther_than_all_the_Stars_-_02_Mars_Landscape-_Sun_Set

Video used in video reward: "Big Buck Bunny", acquired from https://peach.blender.org (adapted by Cleland, Hira)