

TE REO APP

*System Documentation*

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# Introduction

Established in the 1980s, Te Wānanga Māori is one of the first faculties of Whitireia Community Polytechnic and is made up of three departments: Māori Art, Nursing, and Te Reo Māori.  The client for our project is the Reo Māori department. In order to achieve proficiency in both formal and informal situations, the school takes the approach of teaching students traditional Māori.  Once students have become proficient in using traditional Māori, students are then in a position to learn more colloquial expressions and judge when it is appropriate to use them.

Our client, Eruera Ruwhiu of the Reo Māori department, wants their students to learn the use of *‘ehara’* in the proper traditional sense and not its current colloquial usage. He also finds that their students tend to interchange the usage of *‘ehara’* and *‘kahore’* as they are quite similar. As most of the students use their mobile phones or tablets to access online learning resources, our client wants an application that students can use on their mobile phones that will emphasise the correct usage of *‘ehara’* and *‘kahore’*.

The Android application being developed provides a means for users to improve their learning of te reo sentence structures, specifically in the area of negatives *(ehara and kahore).* The purpose of this is provide students with a portable resource that can be easily accessed and that complements existing classroom resources.

Although the application is being designed specifically with the level 5 students in mind, it will be useful to any adult wanting to get practice in using Māori sentence structures. The potential users are all those who are familiar with using smart phones and have a moderate level of competency in using them.

# Scope

1. This project creates a initial working prototype of an Android application to help te reo Māori learners practice sentence structures, specifically the traditional use of *ehara* and *kahore* in negative expressions.
2. While this first iteration project focuses exclusively on providing learners with a means of practicing the use of *ehara* and *kahore*, the application is designed so different sentence structures can be added in future iterations.
3. Using RAD development methodology, which calls for project to be split into iterations, this project was made up of five two‑week iterations that progressively built on the previous iterations.
4. Each iteration was made up of:
   1. The development of a useable interface. It should be noted that the interface design is just a placeholder, as the goal for this iteration of the project was to produce a prototype that can be further developed, rather than one that fully enhances the user experience.
   2. The development of a database in SQLite that stores the sentence structures. Three question and answer combinations have been provided by the client for use in this project.
   3. The development of the backend programming in Android Studio which ties together the database and interface and provide the application’s functionality.
   4. Testing of the components that have been developed. Black box testing was used to test the prototype, as the focus of this project was to produce a functional product and black box testing is ideal for identifying:

* Incorrect or missing functions
* Interface errors
* Errors in data structures or external database access
* Behaviour or performance errors
* Initialization and termination errors
  1. At the end of each iteration the Client was presented with the product for feedback. In the initial iterations this was simply an interface and as the application went through each iteration further functionality was added.

1. The application is designed to work on a Nexus 5 mobile device running Android 6.0.1. The application may not be fully functional on other versions of Android or any other mobile device.
2. A user manual and system documentation have been created to support the application. This documentation provides the client and future developers with background and reference material about the project.

# System Configuration

- Development environment: Android Studio 3.1.4

- Compile SDK version: 28

- Minimum SDK version: 23

- Target SDK version: 28

Devices used for development: Nexus 5 running Android 6.0.1 (The application may not be fully functional on other versions of Android or any other mobile device.)

**Repository:**

<http://20020584@git.pcsupport.ac.nz/21100124/TeReoApp_2018.git>

**Database:**

SQLite used in conjunction with DB Browser for SQLite.

<https://www.sqlite.org/index.html>

<http://sqlitebrowser.org/>

**Images:**

<https://designassembly.org.nz/2017/09/11/cultural-relevance-in-the-digital-age-emotiki/?fbclid=IwAR2qdI7UVns_S2ec7tSgxTtFyG-N3EEGw5dL47SStGT5K1nMpVyic3cxvQM>

**Note on macrons:**

In order to easily type macrons (ā,ē,ī,ō,ū etc) it is best to install the Māori keyboard.

Once the keyboard is installed users simply need to type '`' and then the relevant vowel.

Instructions on how to do this can be found at <https://kupu.maori.nz/about/macrons-keyboard-setup>

# Database Design

The database designs below provide abstract representations of the data to be included in the Nenekara application. The diagrams cover the data required to meet the objective of enabling students to practise sentence structures, while at the same time forming a foundation if later iterations decide to add other features such as a student login and tracking statistics.

It should be noted that in the initial prototype of the application, only the ‘ID’, ‘sentence’, ‘question’ and ‘red\_herring’ columns have been implemented. More information regarding further work to be done can be found in the Future Iteration section of this report.

## Conceptual Diagram



## Logical Diagram



## Physical Diagram



# Program Classes

***Main Activity***

This is the home page of the application and consists of button instances (**START** and **ABOUT**) and layout images. It also includes methods to open up the *Category Activity* and the *About Popup* message.

***Category Activity***

This contains button instances which shows the Instructions popup message, starts the *Sentence Structure Activity*, and returns to the homepage (*Main Activity*).

***Sentence Structure Activity***

This includes most of the functionality of the application, especially the Drag and Drop function. This class builds the layout of the page by creating instances of buttons, widgets, and layout containers. It also creates an instance of the *DBHandler* to retrieve data from the existing database. Layout containers are then used to separate the sentences from the database into single words which allows them to be dragged and dropped by the user. Audio files are also added which are played when the user clicks the Play Audio button or when the correct answer is submitted.

***DBHandler***

A class which builds the database using Android Studio’s embedded database, SQLite. Within this class, the database is created and data is added into it.

***About Popup***

A simple class which displays a popup message at the homepage (Main Activity) to display information about the project, the project team, and the client.

# Status Reports and Future Iteration Plan

|  |  |  |
| --- | --- | --- |
| **Item** | **Current Status of Item** | **To do** |
| **Database Design** | The database design for the current prototype is complete. |  |
| **Prototype Application** | A prototype has been built including:   1. User interface 2. SQLite database that stores 3 Māori question/sentences. 3. Back‑end coding to enable the prototype’s functionality of enabling users to practice the use of ehara/kahore by unscrambling sentences. 4. M4a audio has been added for each question and sentence. |  |
| **Testing** | Black box testing has been done for each iteration. |  |
| **Usability testing** | Usability of the application has been tested by client, supervisor and project team. | Test the application with end‑users (students of Te Reo) to ascertain if there are other changes that can be made to improve usability. There may be insights that a learner of Te Reo may be able to provide that are not obvious to other testing groups. |
| **Refinement of the UI** | The prototype UI has a place‑holder design to provide visual interest, but is not intended to be final. | Improve and test the user interface, so that the application has its own look and feel. |
| **Māori icons** | The icons currently used on the prototype are generic, open‑source icons. | Unique and licenced icons should be found to give the application a distinct style. |
| **Stylised message boxes** | The prototype uses the Android studio default layout for pop‑up boxes combined with open‑source images. | The message boxes should be formatted to give them a distinct style. |
| **Customisation of launch icon** | The prototype uses the Android studio default launch icon. | A custom image should be added the launch icon. |
| **Database images and audio files** | Audio and images are hard‑coded in the prototype. | Add audio and images to the database and play/display them programmatically. |
| **Category table** | The Categories is hard‑coded in prototype. | A Category table needs to be added and associated with the Sentences table in the database and application. |
| **Test database with large datasets** | The database has only been used for three sentences (without images and audio files) | Investigate if SQLite will be able to handle larger datasets with audio and images files. Consider using a different RDBMS if necessary. |
| **Fix Drag and Drop Movement** | Currently, if a user taps a word in the answer panel it will send that word to the far right of the line, but the user cannot chose where the word is placed. | Modify the drag and drop functionality so that users are able to reposition words in the answer panel by dragging the individual words. |
| **Check content** | Content was provided by two Māori language experts at separate times. | Check that the Māori language used in the application is consistent with language the client wants users to learn. |
| **Instructions** | There are general instructions in the Help button on the Category page instructing people to drag and drop words. | Instructions should be also be accessible from the Sentence Structure screen and/or consider adding an animated run through of how to use the app when it is first loaded. |
| **Device compatibility** | The current prototype been developed and tested for Android 6.0.1 on a Nexus 5 phone. | Develop and test the application for the phones used by the target user‑group (students of Te Wānanga Māori). |

**Possible added features/functionality**

* Add levels of difficulty
* Include audio for individual words
* Keep statistics for user
* Colours for types of words
* Migrate the application to VR tech.
* Provide an interface for the tutor, so the tutor can add their own sentences.

# Appendix

## Test Plans

**Test Plan: Iteration 1, 8 September 2018**

| **Test ID** | **Test Description** | **Expected outcome** | **Actual outcome** | **Test Result** | **Comments** |
| --- | --- | --- | --- | --- | --- |
| 1-1 | Press launch icon | * Application loads and displays start screen | * Application loads and displays start screen | Successful |  |
| 1-2 | Press "Start" button | * Category screen is displayed | * Category screen is displayed | Successful |  |
| 1-3 | Select a category | * Application displays the first sentence from the category | * Application displays the first sentence from the category | Successful |  |
| 1-4 | Drag words from Sentence Panel to Answer panel. | * Words able to be dragged from sentence panel to answer panel. | * Words able to be dragged from sentence panel to answer panel. | Partially successful | The function is working at a basic level, however it can be difficult to "catch" the words in order to drag them (especially the small ones like 'I'). User testing confirmed that this was a barrier to the usability of the app. User testing of this function also highlighted a problem with the position of the buttons - to be moved to the bottom of the screen for future iterations. |
| 1-5 | Press "Clear" button | * Words in the answer panel are moved back into the scrambled sentence panel. | * Clear button returns the words that had been dragged into the response panel to the sentence panel, however it duplicates the question and sentence at the top of the screen. | Partially successful |  |
| 1-6 | Macrons displaying correctly from database | * Macrons displaying properly both in the hard coded text and the text pulled from the database. | * Macrons displaying properly both in the hard coded text and the text pulled from the database. | Successful | No additional work was required for this to work. System accepts macrons created using the standard Māori keyboard layout. |
| 1-7 | Sentence is put in correct order and "Submit" button pressed | * "Correct" message displays |  | NA | Not developed |
| 1-8 | Sentence is put in incorrect order and "Submit" button pressed | * "Incorrect" message displays |  | NA | Not developed |
| 1-9 | Images are displaying correctly from database |  |  | NA | Not developed |
| 1-10 | Audio of correct sentence is played |  |  | NA | Not developed |
| 1-11 | Next sentence loads correctly |  |  | NA | Not developed |
| 1-12 | Option to exit the screen works |  |  | NA | Not developed |

**Test Plan: Iteration 2, 21 September 2018**

| **Test ID** | **Test Description** | **Expected outcome** | **Actual outcome** | **Test**  **Result** | **Comments** |
| --- | --- | --- | --- | --- | --- |
| 2-1 | Press launch icon | * Application loads * Displays start screen | * Application loads * Displays start screen | Successful |  |
| 2-2 | Press "Help" button. | * Pop up displays general instructions for the application * User is able to cancel out of pop up and return to start screen. | * Pop up displays general instructions for the application * User is able to cancel out of pop up and return to start screen. | Successful |  |
| 2-3 | Press "About" button. | * Information regarding the client and development team are displayed. * Cancel returns the user to the Home screen. | * Information regarding the client and development team are displayed. * Cancel returns the user to the Home screen. | Successful |  |
| 2-4 | Press "Start" button | * Category screen is displayed | * Category screen is displayed | Successful |  |
| 2-5 | Select a category in the Category screen. | * Application displays the first sentence from the selected category scrambled up in the sentence panel. | * Application displays the first sentence from the selected category scrambled up in the sentence panel. | Successful |  |
| 2-6 | Drag words from Sentence Panel to Answer panel. | * Words able to be dragged from scrambled sentence panel to answer panel. | * Words able to be dragged from scrambled sentence panel to answer panel. | Successful |  |
| 2-7 | Sentence is put into correct order and "Submit" button pressed | * "Correct" message displays and prompts user to tap screen for next sentence. | * "Correct" message displays and prompts user to go to the next sentence | Successful |  |
| 2-8 | User taps "Next" in the "Correct" popup. | * Next sentence in category is loaded. | * Next sentence in category is loaded. | Successful | Need to advise user when last sentence has loaded. |
| 2-9 | Sentence is put into incorrect order and "Submit" button pressed | * "Incorrect" message displays. |  | NA | Not developed yet. |
| 2-10 | Press "Home" button | * Popup displayed confirm user wants to return Home. * Pressing "Yes" on pop up returns the user to the Start page. * Pressing "No" cancels the pop up and returns user to the sentence they were on. | * Popup displayed confirm user wants to return Home. * Pressing "Yes" on pop up returns the user to the Start page. * Pressing "No" cancels the pop up and returns user to the sentence they were on. | Successful |  |
| 2-11 | Drag words with in answer panel | * Order of words in answer panel is able to be rearranged. | * Tapping words moves them to the far right of the panel. | Unsuccessful |  |
| 2-12 | Press "Clear" button | * Words in the answer panel are moved back into the scrambled sentence panel. | * Words in the answer panel are moved back into the scrambled sentence panel. | Successful |  |
| 2-13 | Sentence is put in correct order and "Submit" button pressed | * "Correct" message displays * "Correct" audio plays. |  | NA | Not developed |
| 2-14 | Sentence is put in incorrect order and "Submit" button pressed | * "Incorrect" message displays * "Incorrect" audio plays. |  | NA | Not developed |
| 2-15 | Audio of correct sentence plays. |  |  | NA | Not developed yet. |
| 2-16 | Images display | * When sentence loads an image related to the sentence is also displayed. | * When sentence loads a place holder image displayed. | Partially successful | The application displays a place holder image. |

**Test Plan: Iteration 3, 15 October 2018**

| **ID Number** | **Test Description** | **Expected outcome** | **Actual outcome** | **Test**  **Result** | **Comments** |
| --- | --- | --- | --- | --- | --- |
| 3-1 | Press launch icon | * Application loads and displays start screen | * Application loads and displays start screen | Successful |  |
| 3-2 | Press "Help" button. | * General instructions for the application are displayed in a pop up. * User is able to cancel out of pop up and return to start screen. | * General instructions for the application are displayed in a pop up. * User is able to cancel out of pop up and return to start screen. | Successful |  |
| 3-3 | Press "About" button. | * Information regarding the client and development team are displayed. * Cancel returns the user to the Home screen. | * Information regarding the client and development team are displayed. * Cancel returns the user to the Home screen. | Successful |  |
| 3-4 | Press "Start" button | * Category screen is displayed | * Category screen is displayed | Successful |  |
| 3-5 | Select a category in the Category screen. | * Pop up screen displays Category‑specific instructions   When user closes popup, application loads sentence screen and displays:   * Question from database * Answer sentence scrambled up from database. | * Pop up screen displays Category‑specific instructions   When user closes popup, application loads sentence screen and displays:   * Question from database * Answer sentence scrambled up from database. | Successful | Category and category instructions are hardcoded. |
| 3-6 | Drag words from Sentence Panel to Answer panel. | * Words able to be dragged from scrambled sentence panel to answer panel. | * Words able to be dragged from scrambled sentence panel to answer panel. | Successful |  |
| 3-7 | Sentence is put into correct order and "Submit" button pressed | * "Correct" message displays and plays. * Audio of the correct sentence plays. User prompted to tap screen for next sentence. | * "Correct" message displays and plays. * Audio of the correct sentence plays. User prompted to tap screen for next sentence. | Successful | Audio is hardcoded. |
| 3-8 | User taps "Next" in the "Correct" popup. | * Next sentence in category is loaded. * If user has got to final sentence, load "Congratulations" popup and take user to Home screen. | * Next sentence in category is loaded. * If user has got to final sentence, load "Congratulations" popup and take user to Home screen. | Successful |  |
| 3-9 | Sentence is put into incorrect order and "Submit" button pressed | * "Incorrect" popup displays and plays audio. * Cancelling popup returns user to the main screen. | * "Incorrect" popup displays and plays audio. * Cancelling popup returns user to the main screen. | Successful | It was decided to leave the users sentence in place when cancelling the pop up, rather than resetting the app. This is so the user can look at what they have done and analysis where they have gone wrong. The user can reset the sentence themselves by using the "Clear" button. |
| 3-10 | Press "Home" button | * Popup displayed to confirm user wants to return Home. * Pressing "Yes" on pop up returns the user to the Start page. * Pressing "No" cancels the pop up and returns user to the sentence they were on. | * Popup displayed to confirm user wants to return Home. * Pressing "Yes" on pop up returns the user to the Start page. * Pressing "No" cancels the pop up and returns user to the sentence they were on. | Successful | This was included for later stages if a score is kept. |
| 3-11 | Drag words within answer panel | * Order of words in answer panel is able to be rearranged. | * Tapping words moves them to the far right of the panel. | Unsuccessful |  |
| 3-12 | Press "Clear" button | * Words in the answer panel are moved back into the scrambled sentence panel. | * Words in the answer panel are moved back into the scrambled sentence panel. | Successful |  |
| 3-13 | Images display | * When sentence loads an image related to the sentence is also displayed. | * When sentence loads an image related to the sentence is also displayed. | Successful | Hardcoded |