**Department of Computing**

**Bachelor of Science (Hons) in Software Development**

# Creche Connect

## Research Manual

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## Abstract

The Creche Connect application aims to create a simple and secure platform for childcare practitioners to track the pupil's progress and communicate effectively with parents/guardians about their child's development.

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# 1.   Introduction

The Creche Connect application aims to create a simple and secure platform for childcare practitioners to track the pupil's progress and communicate effectively with parents/guardians about their child's development.

# 2.   Market Analysis

The childcare sector in Ireland employs nearly 31,000 childcare workers who care for more than 200,000 children in 4,600 childcare centres [1].

There are many management applications for Early Years and Pre Schools on the market. Here are some of them: ECCEsoft [2], TeachKloud [3], Child Paths [4], and Little Vista [5].

They are all great applications, but they have one weakness. They are trying to do too much.

The origin of these applications was to aid childcare practitioners, but with each product iteration, they became more complicated and over-engineered.

Practitioners are overwhelmed with the amount of information which can be frustrating and inadvertently affect their performances.

The Creche Connect promises to remain simple through its releases. User input is essential, but the app cannot be compromised. There are already applications on the market which can do HR parts like billing, invoicing, and employee management.

Creche Connect focuses on the child's progress and communication between childcare centres and parents/guardians. The application is simple to use, with an intuitive design which will decrease training time.

## 2.1.   Competitors
### 2.1.1.   ECCEsoft

*Figure 2-1. ECCEsoft Registration screen. **Source**: [4]*

Early Years service providers can use ECCEsoft [4] as a complete management system to ensure the smooth operation of their setting. Three integrated applications comprise the system:

- Early Years Management System - is intended for management with several integrated functional modules like registration records, family communication, and occupancy planning.
- Room Mobile Application - is intended for room-based staff to view child details, communicate with parents, keep records of attendance, incidents, medication, monitoring, and learning, and access staff resources instantly.
- Parents Portal Application - family members can access their child(ren)'s care and education records, share information, and access their financial accounts.

ECCEsoft is a cloud-based system which allows users to access the application anywhere using any device.

Depending on the needs of a childcare centre, the ECCEsoft team offers three price options: starter, standard, and supreme.

**Personal opinion.**

Out of all applications presented here, ECCEsoft is the least user-friendly. At times I felt overwhelmed by the way information was given to me.

If you are sitting in the office and have time to go through functionalities, it may be a good application, but if you want to enter information fast, this is not an app I recommend using.

### 2.1.2. TeachKloud



*Figure 2-2. TeachKloud Attendance screen. **Source**: [2]*

TeachKloud [2] is available for Android and Apple devices. Version 7 of Android is required (with Play Store access), while iPads should be 2015 or newer.

TeachKloud offers

- Communication between parents and teachers. Easily share images, videos, documents and daily sheets
- Attendance tracking and reporting
- Learner journals, observations
- Invoicing and billing

- Customisable forms
- Rosters and timesheets
- Daily Records, including meals, temperature checks, and general comments

The cost of TeachKloud depends on the number of children in the service. No set-up fees.

**Personal opinion.**

I liked the straightforward design of the application. The person behind the product has a degree in Early Childhood Education, which is noticeable.

The app is relatively easy to use. The learning curve shouldn't be too steep. I thought that the customisation of forms was beneficial.

Overall the application is quite good.

### 2.1.3.    Child Paths

*Figure 2-3. Child Paths Milestones screen. **Source**: Demo*

Child Paths [3] software offer:

- Attendance tracking
- Billing and Invoicing
- Calendar Management
- Communications management
- Employee Management
- Enrollments / Onboarding
- Meal / Nutrition Management
- Member Database
- Parent Portal

- Payment Processing
- Registration Management
- Self-check-in / check-out

**Personal opinion.**

Very nice layout. Clear design. I found the pop-up menu a bit fussy, and I prefer that that menu be permanent on the left-hand side.

I liked the way the Milestones of each child were presented. It was the only moment I used the app where I felt that the child was the most important part of this product.

Many functionalities are available, but it feels too many, even if nicely presented. Users can get used to it after a while, but at the beginning, the app may feel overwhelming.

### 2.1.4. Little Vista
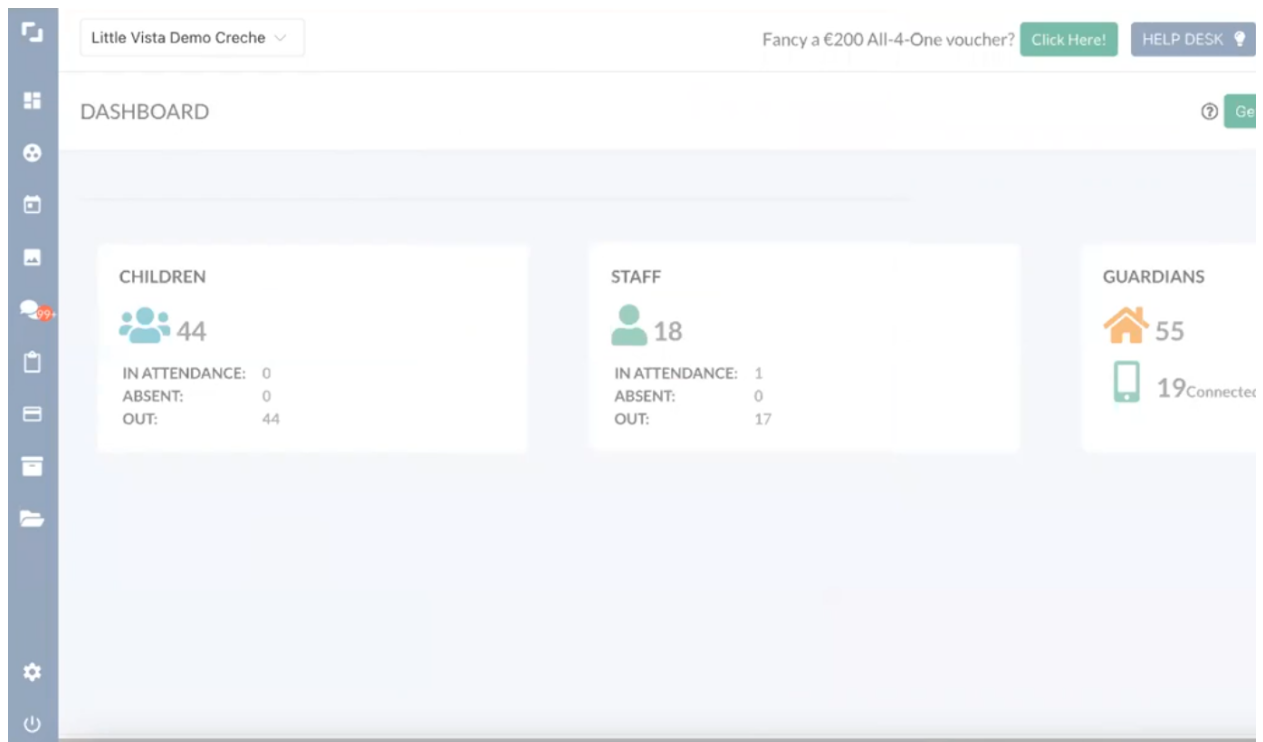


*Figure 2-4. Little Vista Dashboard screen. **Source**: Demo*

Little Vista [5] is a mobile application for Android and iOS devices. Available features:

- Tablet Activity Recorder - manage a child's attendance, meals, and sleep records, and create and share observations, learning stories, and curriculum-based activities.
- Little Vista Manager -  the application handles attendance tracking, fee collection, occupancy planning, overall views of observations, curriculum-based activities, and meals and sleep records.

- Family App - a parent/guardian receives real-time daily updates, including photos, videos, audio clips, curriculum-based activities, and information about meals and sleeps time.
- Checklist and Compliance - customisable forms and checklists

Little Vista offers three price plans: manager +, learning, and learning +, which has all the features. No set-up fees.

**Personal opinion.**

This app feels similar to TeachKloud and is well thought out and intuitive. I prefer if the menu on the left were not pop-out, but It was better than Child Paths.

## 2.2.   Conclusion

Except for ECCEsoft, I liked all of the applications. They all have something to offer and depending on the childcare centre and their needs they will find something that will fulfil their requirements.

However, Creche Connect will have a place on the market because it is focused on children. The above applications felt they were built from the business essentials perspective, whereas Creche Connect is created around children and their needs.

# 3.   Technologies

Globally, there are over 6.3 billion smartphone users, which makes the mobile app industry a growing industry. Mobile application usage and smartphone penetration continue to grow steadily, and neither trend looks set to slow down anytime soon. On top of that, over recent years, the number of tablet users has grown 36% to 1.14 billion worldwide [6].

For a very long time, there was only the option to build native applications for Android or iOS, and there was no other option. Native apps are developed specifically for smartphones, tablets, and other smart devices and are designed to run on the respective operating systems and hardware. Programming languages specific to individual platforms are used to develop native apps, for example, Java for Android and Swift or Objective-C for iOS.

Technologies evolved and then came frameworks like Flutter, React Native, Xamarin or Cordova, which simultaneously allowed the creation of apps for both systems.

The next iteration of creating cross-platform applications is Progressive Web Apps (PWAs) [6], an advanced form of a responsive website that functions like a mobile app.

PWA is a website that looks like a native app and can be accessed either from the browser or installed directly on the device. A PWA has three basic components: CSS, Javascript, and HTML. Developing a PWA is much simpler because almost any mobile device has a web browser that can display a PWA flawlessly.

A few years back, Creche Connect was built as a native app because it would be the best way to do it. However, PWAs have evolved since they were introduced for the first time. Today, PWAs offer so much with their multi-platform flexibility, responsiveness, and security that I choose this technology as the development platform.

This paragraph will list technologies used to build Progressive Web Apps.

## 3.1.  HTML

A web page's structure is determined by HyperText Markup Language (HTML) [7]. HTML specifies how web content will be displayed, such as paragraphs, lists, headings, links, images, multimedia players, and forms.

## 3.2.  CSS

Cascading Style Sheets (CSS) [8] allow styling HTML by altering the text size and font, adding borders and drop shadows, creating multiple columns, animations, style layout and many more.

## 3.3.  JavaScript

JavaScript [9] is a programming language that enables the implementation of sophisticated features on web pages, like saving users' data locally on their device, making UI elements appear or disappear, animating 2D/3D graphics, and much more.

## 3.4.  Bootstrap

Free and open-source, Bootstrap is a framework for creating mobile-first, responsive websites. Various interface components, such as typography, forms, buttons, navigation, and more, are included as HTML, CSS, and (optionally) JavaScript design templates [10]. Bootstrap is a "sleek, intuitive, and powerful front-end framework for faster and easier web development" [11].

## 3.5.  HTML5 Boilerplate

HTML5 Boilerplate is an HTML, CSS and JavaScript template (or boilerplate) that allows users to build quick, solid and flexible websites with cross-browser compatibility [12].

### 3.6.    AngularJS

AngularJS is an application development framework that solves the most common problems in web development. In addition to being fully extensible, it works well with other libraries. Features can be modified or replaced according to each project's development workflow and feature requirements [13].

### 3.7.    Ionic

Ionic is a toolkit with built-in JavaScript support, allowing developers to create cross-platform mobile applications in React, Vue, or Angular using a shared code base, enabling them to create stunning, flexible UIs for all significant platforms [14].

### 3.8.    Vue.js

The framework allows building user interfaces and single-page applications using JavaScript. Its flexible ecosystem offers an intuitive API based on HTML, CSS, and JavaScript [15].

### 3.9.    Polymer

Polymer [16] uses Web Components to build web applications. It is an open-source JavaScript library. It provides features for creating custom elements, making it easier and faster to work like standard Document Object Model (DOM) elements.

### 3.10.    ReactPWA

ReactPWA [17] is a simple but extendable boilerplate built on top of PawJS [18], a highly scalable & pluggable Progressive Web Application Framework with the best Developer Experience. This framework utilises the power of React with Webpack and builds on top of webpack/tapable for unlimited extendability.

### 3.11.    Workbox.js

Workbox [19] is a module that simplifies common service worker exchanges like routing and caching. A specific characteristic of service worker development is addressed in each module, and Workbox aims to make it even easier. It encapsulates the low-level APIs like the Service Worker API and Cache Storage API and exposes more developer-friendly interfaces.

### 3.12.    CouchDB

CouchDB [20] is a web-based database. They are using JSON documents to store data. HTTP provides access to documents via a web browser. JavaScript allows users to query, combine, and transform documents. Modern mobile apps and web applications work well with CouchDB. Data can be distributed efficiently. There is an automatic conflict detection feature in CouchDB that supports master-master setups.

## 3.13.    Appwrite

"Appwrite [21] is an end-to-end backend server aiming to digest the intricacy of standard, challenging, and repetitive tasks required to build a modern app." Appwrite provides tools, APIs, and a UI console to help build apps faster and more securely. Between Appwrite's different services, there is user authentication and account management, user preferences, database and storage persistence, cloud functions, localisation, image manipulation, and more.

## 3.14.    Docker

Docker is a platform and technology for building, shipping, and running distributed applications. It uses a containerization approach to virtualization, making it lightweight and portable. This allows developers to package their applications and dependencies into a single container, which can be run consistently across different environments. Docker also provides tools for managing and deploying containers, making it a popular choice for development and production environments.

## 3.15.    Syntactically Awesome Style Sheets (SASS)

SASS (Syntactically Awesome Style Sheets) is a CSS preprocessor, a scripting language that extends the capabilities of CSS and adds features such as variables, nested rules, mixins, and functions. It simplifies the writing and maintenance of CSS styles. A SASS file is compiled into CSS, which web browsers can interpret. By writing organized and modular code, SASS makes large stylesheets easier to maintain and scale.

## 3.16.    Firebase

"Firebase is a mobile and web application development platform developed by Google". It provides several services, including a real-time database, authentication, and hosting. Firebase's real-time database allows developers to store and sync data across multiple clients, which helps build collaborative and responsive applications. The authentication service allows developers to easily add user authentication to their apps, while the hosting service allows for easy deployment of web applications. Firebase also provides tools for analyzing and understanding app usage, as well as for sending push notifications.

# 4.  Discoveries

## 4.1.  First Iteration

Based on research, the technologies which I choose to create the Creche Connect app are:
- HTML, CSS, and JavaScript - as these are the foundations of each PWA
- Bootstrap - it offers many responsive design templates which help with the development of the project
- ReactPWA - as a framework because of its simplicity, stability and performance.
- Appwirte - to host database.

## 4.2.  Second Iteration

During this iteration, I experienced a small setback as I had to reinstall my operating system because Pop!_OS was freezing too often due to recent updates.

I have chosen Linux Mint as it is based on Ubuntu, just like Pop!_OS.

Once everything was set, I discovered that Appwrite was not the best choice because it is a relatively new product, and there are not as many materials to learn from. Although this change has set me back, it will benefit the project's progress.

After further research, I have decided to go with Firebase, which is well-known and popular among developers.

I did not use as much HTML during this iteration, and I replaced CSS with Syntactically Awesome Style Sheets (SASS) because it works better with React and Bootstrap.

I have managed to connect my project to Firebase and store user details.

Next iteration, I will focus on the primary use case, communication.

## 4.3.  Third Iteration

Connect component was completed. I can now send messages and pictures to other users. The biggest challenge during this stage was an infinite loop constantly reloading user messages. This caused a browser slowdown, which made inspecting code quite difficult. It was caused, as usual, by a typo.

Connect component also requires stylesheet adjustment. It is responsive, but some elements are not where they should be when adjusting the screen size. Also, messages are not displaying as they should.

The next step is to add a function allowing the user to add, update and remove a child from the system and address styling issues.

## 4.4.    Final Iteration

This was the most enjoyable part of the project because I could focus entirely on the task because all other assignments were completed.

During this phase, I learned to appreciate GitHub and the importance of regular commits. On a few occasions, I made the mistake of not committing regularly, and then instead of rolling back when I broke something, I had to rebuild from scratch or track back and learn where things went wrong. This takes time. Time which was not on my side.

The 100% commitment and focus allowed me to add functionalities I hadn't considered before like Add Review or Archive.

I also had to learn not to get sidetracked by petty perfectionism or additional functionalities that I would like but, due to time constraints, would only derail my progress.

During this iteration, I discovered a newfound respect and admiration for developers and designers who work with CSS and SCSS.

Making the messaging page web responsive and functional almost broke me. I was set back for three days. I eventually managed to do it, but the time I lost to do it took a toll, and I had to resign from adding notification functionality, which would be a fantastic addition to the application, but it had to be pushed for future iterations.

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