

A Study for Improving Parental Engagement with Childcare Centers in New Zealand via Mobile Technology

Advance Mobile and Wireless Technology

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1. Introduction

Childcare centers play a vital role in daily lives of New Zealanders where it serves as the foundation for Early childhood education and care, facilitating professional parents' participation and supporting infants and toddlers in their holistic development. Childcare centers are increasingly incorporating digital tools to enhance communication, safety, education, and administrative efficiency with the rapid advancement of mobile and wireless technology. In this era where both parents often engage in the workforce, the demand for childcare services that provide more than supervision, but also educational and social development has increased. Childcare center provides early childhood education, care, and supports children's holistic development [1]. This report aims to explore the background analysis of New Zealand childcare services, evaluating the current business process.

2. Background Study and Analysis

As in many urban areas in world, the childcare industry in New Zealand consists of a variety of offerings, from private day care centers to community-based services. Around 96.8% of children in New Zealand attend childcare centers while every center is guided by the curriculum framework of "Te Whariki" [2]. However, parents always face difficulties in finding & selecting the right childcare service due to a lack of centralized information. They must navigate through various resources to get details about locations, availability, staff, facilities, and rates, which can be time-consuming and stressful. Searching for data on different platforms can waste considerable time and inefficiencies. Each resource can have its own interface, search parameters and methodologies for performing data, which increases the duration required to collect all essential information.

The flow of collecting information from dissimilar sources can be mentally demanding. It includes safeguarding accuracy, categorizing through many data, and comparing the best option. The parental side observes their decision-making flow regarding childcare as inactive and often depends on recommendations from others rather than actively discovering numerous options. This suggests a tendency towards accepting default options rather than actively engaging in a comparative analysis of available alternatives [3]. An Early Childcare center is considered a child's first environment outside of their home where they engage in both socialization and structural education [4]. Therefore, modern parents are more concerned about the quality of education provided by teachers in care centers.

3. Business Process

The ministry of education provides a certain amount of funding for three to five years old up to a maximum of 6 hours per child per day and 20 hours per week as subsidy. [2] The number of children a childcare center can enroll and maintain depends on how big it is and where it is located. Info care is currently the most widely used system in childcare centers. The center's business process encompasses several key aspects:

- **Enrollment** – Information is received about the center's programs, philosophy, and enrollment procedures and followed by registration using manual paperwork for billing and tracking attendance.
- **Registration** - Parents interested in enrolling their children to the center fill in the form and schedule a visit to the center and move for the orientation program.
- **Communication** - Communication in childcare centers is multifaceted and vital for maintaining strong relationships between parents and caregivers. Regular updates and reports are provided to offer detailed insights into a child's behavior, keeping parents informed and engaged in their child's daily experiences. Information about upcoming events and activities are communicated through newsletters or digital platforms, allowing parents to participate and plan accordingly. In times of emergency, clear protocols ensure swift communication with parents, providing reassurance and updates as needed. [5]
- **Safety and Security** - Safety and security in childcare centers are upheld through a multi-layered approach. It begins with an inclusive risk valuation of the premises to identify potential threats, followed by the growth and operation of stringent safety policies and procedures. Staff members undergo rigorous training to ensure they are equipped to respond effectively to emergencies and maintain proper supervision of the children. Secure entry and exit procedures are enforced, along with regular drills to prepare for various emergencies. Furthermore, childcare centers prioritize well-being and cleanliness practices to prevent the spread of illness. Transparent communication with parents about safety measures and continuous evaluation and improvement of protocols ensure that the center preserves a secure environment for the well-being of the children under their care.
- **Emergency Preparedness Plans** - Childcare centers are designed with safety features, including equipment for fire suppression, sensors to detect harmful gases, and first

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aid kits, child-sized furniture and equipment are also selected and arranged to minimize injury risks.

- **Staff Training** - All staff members receive training in safety procedures, including CPR, first aid, and basic childcare safety protocols. They are also trained to recognize signs of abuse or neglect and understand reporting procedures. [4]
- **Child Supervision** - Childcare centers always maintain strict supervision of children, both indoors and outdoors. Ratios of children to staff members are typically set and monitored to ensure adequate supervision and individual attention.
- **Health and Hygiene Practices** - Centers enforce strict health and hygiene practices to prevent the spread of illness and maintain a clean environment. This includes regular handwashing for children and staff, proper diapering and toileting procedures, and routine cleaning and sanitizing of toys, surfaces, and common areas.
- **Background Checks** - As mentioned earlier, thorough background checks are conducted on all staff members to ensure they have no history of criminal activity or child abuse.
- **Child Pick-Up Policies** - Centers implement strict policies for child pick-up, requiring authorized individuals to present identification and sign children in and out. This helps prevent unauthorized individuals from accessing the facility or removing children without permission.
- **Continuous Monitoring and Improvement** - Childcare centers constantly evaluate and update their safety protocols to ensure compliance with legal standards. This ongoing process of monitoring and enhancement is essential to keep the environment secure for children.

By implementing these safety and security methods, childcare centers strive to create a nurturing and protective environment where children can learn, grow, and thrive.

4. Overview of the Problem

Early childhood education (ECE) is crucial in New Zealand, especially for children from disadvantaged backgrounds, as it sets them up for better academic and social development. According to a previous research study in New Zealand, children who participate in early learning programs tend to excel academically and socially throughout their schooling [6].

However, the high cost of childcare in New Zealand, often forces mothers to leave their jobs or seek unconventional childcare solutions, hindering their ability to participate in the workforce. [7] The government's "He Taonga te Tamaiti" — Early Learning Action Plan aims to ensure all children have access to early learning programs [8]. However, despite government 20 hours subsidies, childcare costs in New Zealand remain among the highest globally, exceeding \$300 per week for children over three years old. [9] According to figure 1, it shows the cost of New Zealand childcare is among most expensive in the world specially compared to the other countries in the region. [7]

NZ childcare costs among most expensive in the world
Cost for parents using childcare facilities as a percentage of the average wage

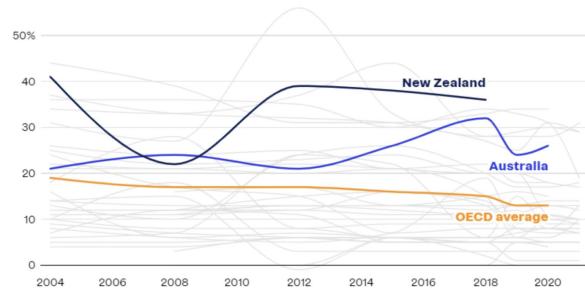


Figure 1: NZ childcare costs among most expensive in the world [10]

This financial burden leads many women to make career sacrifices or face difficulties finding affordable and quality childcare options [9]. As the figure 2 shows from a previous research done in new zealand, it appears that there's a reduced participation intensity of children between age 3-4, beyond the government concession of 20 hour period. [11]

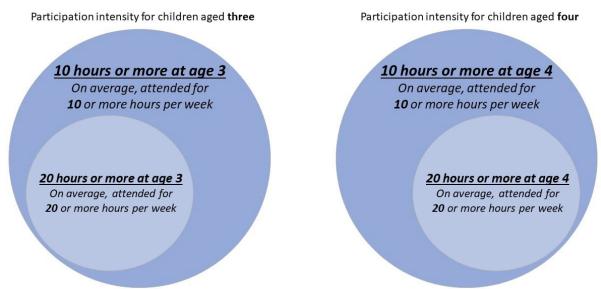


Figure 2: Participation intensity grouped by age and the number of hours [11]

It further shows that the childcare centers in New Zealand mostly operate independently, each with their own websites and communication channels. This decentralized setup causes inefficiencies for parents, experience teachers, especially new immigrants, who will require to individually contact multiple centers to inquire about availability, suitability and employment opportunities. This fragmented system inconveniences for both parents and potential employees while posing challenges for childcare centers in reaching more potential clients and enrollment processes.

5. Analysis and Justification for the proposed solution.

As per the analysis, the issue of disconnected childcare centers in New Zealand underscores the need for a centralized communication platform to streamline the enrollment process to improve coordination between parents and centers. Addressing this problem can enhance accessibility, efficiency, and satisfaction for all stakeholders involved.

5.1. Analysis of potential solutions.

The issue at hand revolves around the lack of connectivity and centralized communication among individual childcare centers in New Zealand. Considering the facts and it appeared four, but not limited solutions as follows:

- **National Online Portal** - Develop a government-backed online portal that serves as a centralized platform for all childcare services across New Zealand.

Benefits: This portal could provide comprehensive information on available childcare centers, including location, capacity, fees, programs offered, and staff qualifications. It would allow parents to apply to multiple centers through a single application form, track their application status, and receive updates.

Limitations: The Early Childhood Council has already raised several concerns to the new government. [12] However, building such a centralized national platform could take a considerable time and will not be sufficient to address the current situation at hand as it requires an immediate solution.

- **Web Site** - Creating a website to function as a centralized platform for all childcare services.

Benefits: Selecting a web-based application for centralized childcare centers will streamline operations, improve parent communication, ease managing regulatory compliance in childcare industry, and provide a safe environment for children.

Limitations: Accessibility will be an issue due to the requirement of internet for every access. This may have communication interruptions. As far as security is concerned, there is always a risk of data breaches. A web-based method of communication will be costly.

- **Existing Applications** - Select and promote an existing childcare application that has subscriptions in the market to help address this issue.

Benefits: Using existing applications for centralized childcare centers helps streamline related operations and will avoid investing for developing such a solution.

Limitations: The government has issued specific guidelines for handling personal information offshore, stressing due diligence regardless of where providers process data. Providers are required to protect personal data, while agencies remain accountable for its privacy. [13] However, the prevalence of applications storing data in various countries poses limitations.

- **Mobile Application** - Create a mobile app for New Zealand market, making it easier for parents to search for childcare services on-the-go.

Benefits: Mobile applicants improve efficiency and productivity by streamlining communications and tasks [14]. Enhance user engagement through personalized, interactive experiences and leverage smartphone features like GPS and cameras for innovative functionalities. Personalization improves customer service and loyalty, while accessibility allows for the convenience of using services anytime, anywhere [15].

Limitations: Data privacy and security concerns due to the sensitivity of children's information.[16] The digital

divide presents access challenges for some families, potentially exacerbating inequalities [17]. Over-reliance on technology can also reduce personal interaction between parents and caretakers. The need for substantial investment in training and infrastructure poses a challenge for resource-limited settings.

5.2. Justification for selecting the solution

In summary, creating a Mobile Application, offers a comprehensive and forward-thinking approach to addressing the childcare needs of parents in New Zealand. By embracing mobile technology, we can deliver a user-centric, accessible, and engaging platform that empowers parents with the tools and information they need to make informed decisions about their child's care. Therefore, out of the above discussed solutions, it appears developing a centralized mobile application is a more viable option.

6. Detailed Technical Discussion of the Solution

Technical overview of the solution can be broken down into two main aspects such as features proposed via the new childcare mobile application and high-level proposal for the technical deployment design of the solution.

6.1. Proposed Features in Mobile Application

The mobile app for a centralized platform of childcare services offers instant access to vital information, engages parents with notifications, and simplifies center location through geolocation. It allows customization, seamlessly integrates with different existing systems of childcare centers, and will have capability to scale with future updates.

- **Mobile-First Accessibility** – A mobile-first approach to childcare services ensures instant access to vital information and services for parents, recognizing their reliance on smartphones for daily tasks.
- **Enhanced Engagement** - The mobile app engages parents with push notifications, updates, and alerts, promoting active participation in childcare.
- **Geolocation Features** - Using mobile device capabilities, the app utilizes geolocation for personalized recommendations, allowing parents to easily find nearby childcare centers and access relevant information, streamlining the search process efficiently.
- **Customizable Preferences** - The mobile app provides personalized experiences, allowing parents to customize preferences and receive tailored recommendations based on their needs.
- **Seamless Integration** - The app seamlessly integrates with the National Online Portal, providing a unified experience for parents. Data sync ensures consistency in the childcare search process.
- **Scalability and Futureproofing** - The mobile app offers scalability for future enhancements and updates, ensuring its relevance as technology evolves.

6.2. High-Level Deployment Design of the Proposed Solution

The proposed cross-platform mobile application solution while the backend is proposed to be deployed as microservices on cloud infrastructure, an API gateway for routing, an IAM component for authentication and a scalable database. The proposed design is as follows;

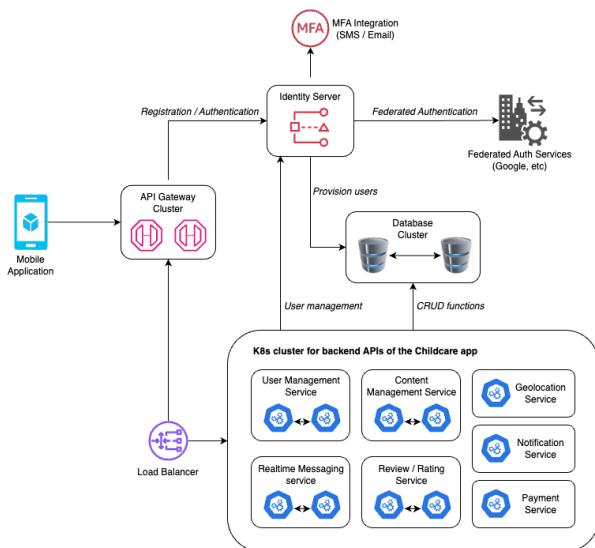


Figure 3: Deployment design diagram in high-level

- **Mobile Application** – Flutter framework is selected to develop the application due to the cross-platform efficiency, rapid and cost-effective app creation with a single codebase, and dynamic UI components make it a preferred choice for mobile app development. [18]
 - **API Gateway** - MuleSoft has been chosen as the API gateway for its robust features, including centralized management, rate limiting, policy management, and seamless integration with various systems, enabling the development of a scalable and efficient infrastructure. [19]
 - **Load Balancer** - Using a load balancer like Nginx or F5 ensures optimal performance, reliability, scalability, and availability by evenly distributing incoming network traffic, dynamically adjusting server resources, and automatically rerouting traffic away from unhealthy servers. [20]
 - **IAM server** - Okta was chosen as a flexible and comprehensive identity management solution that offers customizable policies, automation for streamlined operations, and robust security features including multi-factor authentication. [21]
 - **Database Server** - A non-relational database, MongoDB was selected due to its renowned for supporting complex mobile apps with transactional, search, and analytical features, it excels in managing large volumes of unstructured data with flexibility.
 - **Micro-Service Cluster for backend APIs** - Scalability and independent functionalities are enabled through micro-service architecture in this communication platform which helps for flexibility and service uptime maintenance.

7. Potential Users or User Groups of the Solution

The solution identifies seven potential user groups, described as follows.

- **Professional Parents:** Parents with professionals are searching for reliable and efficient childcare centers for their kids. Those who balance both their career and family responsibilities search for a value quick, comfort, real-time updates, and communication about child's daily activities, frequently depending on technology to organize and optimize these exchanges.
 - **Childcare Provider:** Childcare provider handles the process of childcare facilities such as staff management, communication with parent group and observation to regulatory standards. This group searches for efficient tools to manage administrative duties, enhance parent engagement, concerns on safety and privacy, educational productivity, staff coordination and smooth processing of the center.
 - **Caretaker Job Seekers:** Those who are searching for job opportunities in childcare centers desire a platform that make things easier for process of search jobs including highlights matching with their job category, qualifications, preferences, simplifies the process of applying for jobs and communicating with potential employers.
 - **New Migrants Parents:** Specifically in this group who are with young children, need assistance for navigating the childcare in a new country. They require accessible data on available childcare options, educational outlines, cultural adoption to make informed decisions for their children's care and progress.
 - **Ministry of education:** The Ministry of Education frames policies, educational standards, affords funding and support to childcare centers. This group of user category is interested in tools which help to monitor, enhance educational outcomes and ensure equitable access to quality childcare centers from different regions.
 - **Development Team:** Development team who handles the technical architecture behind the mobile application, responsible for translating user requirements into an efficient and user-friendly solution. They need clear requirements and feedback from all the categories of users to develop the app that challenges come up and improve the childcare experience for parent group, providers and staff of educators.
 - **Kindergarten associations:** This user group represents a collective of kindergartens, supporting childcare staff, facilitating professional growth, and supporting early childhood education. They are looking for solutions that promote the best applies, support the professional development of educators, and improve operational productivity.

In the next section, a detailed exploration was conducted through contextual inquiries and interviews with 3 individuals representing randomly selected 3 users from 3 different user groups are included as *Appendix A*.

8. User Stories and Low Fidelity Wireframes

The proposed solution to make the "Tiaki Kiddos" mobile app, started the process by writing twenty user stories were randomly collected via different user groups. These stories tell what childcare providers, care givers and the parents need from the app, like help with signing up kids, making schedules, and talking to parents, etc. Then, ten low fidelity wireframes were made to show what parts of the app which will look like based on these stories. These drawings help designing how the app could work and make it easier for developers making the app to know what to do in the UI/UX context of the app design.

All such details are included as *Appendix B* in the following document. Putting these stories and drawings in the report shows how the project plans to make an app that helps childcare providers do their jobs better and provide better service for all stakeholders who are in this mobile ecosystem.

9. Conclusion

In conclusion, the comprehensive analysis of early childhood education (ECE) in New Zealand underscores the critical need for accessible, efficient, and quality childcare solutions, particularly in addressing the challenges faced by parents in New Zealand. The proposal for a centralized mobile application emerges as a viable and forward-thinking solution, promising to leverage mobile technology to enhance accessibility, engagement, and user experience. This initiative not only addresses the immediate challenges of connectivity and communication among childcare centers but also lays the groundwork for a more integrated and responsive centralized system in New Zealand.

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Appendix A

User Group 1: Professional Parents

User Profile

1. Name of users: Many

2. General responsibilities or activities:

- Registering and managing child information
- Communicating with staff
- Paying of payments and receiving invoices
- Accessing reports/photos of child progression, behaviour and development
- Receiving alerts on emergencies and incidents

3. Computer skills: Moderate

4. Domain expertise: Moderate

5. Type of system use: Low

6. Goals: To interact and get real-time updates of child development

7. Pain points:

- User likes to receive her child's photos privately
- User would like to do payments online and not physically
- To receive instant updates of child's activities for connectivity

8. Usage contexts: The software app will be used on home and work mobile phones.

9. Software ecosystem: Emails,

10. Collaborators: Teachers, care takers

11. Frequency of use: Occasionally (several times a week)

Persona



Name: Annie Troy

User Role (based on user profile): Software Developer

Gender: Female

Age: 30 years

Education: Bachelor of Computer Science

Location: Wellington, New Zealand

Disability: None

Quote:

With my busy schedule, it was quite a challenge finding a suitable day-care as I need a reliable and a very simple way of staying connected with my child when he is at day-care. I would like to have all tasks at my fingertips because of time constraint and get updates of all activities done.

Computer Literacy:

High Moderate Low None

Application Expertise: (*knowledge of similar systems*)

High Moderate Low None

System Expertise: (*knowledge of a particular system and its methods of interaction*)

High Moderate Low None

Task Expertise: (*Level of knowledge of job and job tasks*)

High Moderate Low None

Frequency of use:

Several times a week (Occasionally).

Attitude (feeling toward job or system): I feel very enthusiastic when using technology for streamlining of daily tasks but at the same time very cautious when it comes to privacy and security issues.

Backstory (including motivation and pain points):

Annie is a busy working professional who is trying to balance her career and challenges of motherhood. The development of her 3-year-old son is her priority during this period and makes sure that he receives education and care with utmost quality while she is away at work. Annie struggled to find a proper childcare that suits her needs. She is a person who is looking forward in simplifying her life with modern technology. Furthermore, she is extremely concerned regarding privacy and security of her personal family data.

Primary activities this user will engage in:

- The easy access to communication with staff of childcare directly for updates and concerns.
- Receiving photos (real-time) of her son's activities daily and confidentially.
- The access of parental tips and educational content when supporting son's learning at home.

Scenario

I have an extremely busy schedule and therefore, my child spends most of his time at day-care. Currently I do not receive instant updates of his daily routine or real-time photos even though there is an app, and this frustrates me as I really want to stay connected with my son throughout the day as I do not get the opportunity due to work. As a result, I am not aware of his behaviour, things he enjoys doing at daytime, his weaknesses etc. Which makes me feel that I am a horrible mum. This makes me embarrassed.

Another thing is that I cannot physically go to day-care every week to make payments and would like to pay online every week. I needed proof of payment to be shown for a visa but unfortunately it was not with me as the app doesn't have that feature. I had to visit day-care to get it and it wasted my time. During the last week, one of my child's photos of misbehaving had gone to another mum and she called me to enquire about it and was questioning me. This was not a good feeling as my personal photos had leaked in another person's hands. I felt unsecure.

Interview

Background: Mrs. Annie Troy is a software developer at a reputed software company who has an extremely busy schedule. She has very challenging responsibilities as a software developer and as a mother. She is trying to balance her career and the challenges of motherhood. She has a 3-year-old son. Annie struggles with finding a suitable childcare which provide suitable education and quality care. Currently she wants to be connected with her child and to be a good mom. She is interested in having a mobile app which can do all the tasks at her fingertips with the concern of privacy and security. This interview below is with Mrs. Annie about the vision and creation of the system. One of our team members contacted to do a contextual inquiry for such system.

Mrs. Troy: Hi

Team Member: Thank you for your time given in your busy schedule. Mrs. Troy, can you describe your typical day and how you manage your childcare for your children?

Mrs. Troy: My day starts early, and I have an extremely busy schedule. As it was quite packed, I dropped my son at the childcare center early morning before heading to work. My child spends most of his time at the day care. It's a challenge to keep up with his activities and progress while I'm at work. Currently I do not receive any instant updates of his daily routine or real time photos even though there is an app. It really frustrates me as I really want to stay connected to him throughout the day. Even though I have a tight schedule I can manage the time to view his photos and updates as I do not get the opportunity due to my work. This makes me feel as if I'm a bad mom. It's a challenge to keep up with his activities and progress while I work. But rather I would like to know about his behavior, things he enjoyed doing at daytime, his weaknesses etc.

Team member: What features do you think would be helpful in a mobile app designed for parents to engage with childcare centers?

Mrs. Troy: Real-time updates would be great, like when my son participates in activities or if there are any urgent issues. Also, a way to easily communicate with his teachers or book parent-teacher meetings would be helpful. Access to his daily schedule, photos, and reports through the app would make me feel more connected to his day.

When I came here 2 years ago it was very difficult to find a childcare center for my son because most of the childcare centers provide their details and enrolment system manually. I really did not have time to hunt for centers and even if I did still there is no way I would know the backgrounds of the teachers there as that is a thing, I consider very important of with whom I will be leaving my child with.

Team Member: In addition to getting updates, what are the other features do you like to have in the app?

Mrs. Troy: I think in addition to that, it needs to be secured. I don't want the photos of my child to go viral on social media. Also, about the payment mode. I would like to have an online payment mode to make the payment and a reminder for the payment would make it easier.

Team Member: Thank you very much for your time. We will share the system design document once we finish our work on it.

Mrs.Troy: Thank you and I would like to wait for your new system.

User Group 2: Childcare Provider

User Profile

1. **Name of Users:** Many
2. **General Responsibilities or Activities:** User would use the website to:
 - Managing Enrollments
 - Scheduling and Attendance Tracking
 - Billing and Payment Processing
 - Communication with Parents
 - Staff Management
 - Curriculum Planning
 - Health and Safety Compliance
 - Facility Management
 - Attendance reporting and Record Keeping
 - Parent Engagement and Feedback
3. **Computer Skills:** Moderate to High
4. **Domain expertise:** Frequent use so moderate expertise to high
5. **Type of system use:** Mandatory
6. **Goals:** To share resources and access them conveniently
7. **Pain Points:**
 - Complex Navigation and user interface
 - Inefficient Communications tools
 - Limited Customization for reports and records
 - Challenges in scheduling and attendance tracking
8. **Usage Contexts:** This application will be used on range of devices including desktops, workstations, and mobile devices. Childcare providers will often access the app on through web browser.
9. **Software Ecosystem:** Payment gate, Email services, Microsoft office, Jira
10. **Collaborators:** Parents, Job seekers, Government officials
11. **Frequency of Use:** Occasionally

Persona



Name: Mike Chen

User Role (based on user profile): Manager of Childcare Centre

Gender: Male

Age: 45

Education: Diploma in Early Childhood Education

Location: Auckland, New Zealand

Disability: None

Quote:

"My goal is to ensure every parent feels connected and informed about their child's experiences at our center."

Computer Literacy:

High Moderate Low None

Application Expertise: (*knowledge of similar systems*)

High Moderate Low None

System Expertise: (*knowledge of a particular system and its methods of interaction*)

High Moderate Low None

Task Expertise: (*Level of knowledge of job and job tasks*)

High Moderate Low None

Frequency of use: (*how often is this type of user likely to use this software?*)

All the time Occasionally Seldom (once or twice a month) Very seldom (once or twice a week).

Attitude (feeling toward job or system):

I rely on our platform for efficient operations and seamless communication to prioritize the well-being of the children in our care.

Backstory (including motivation and pain points):

Experienced childcare centre manager with a passion for providing a nurturing environment for children of all ages. Skilled in overseeing daily operations, managing staff, and maintaining compliance with regulations. Proficient in using technology to streamline administrative tasks and enhance communication with parents. Dedicated to fostering positive relationships with families and ensuring the highest standards of care and education.

Primary activities this user will engage in:

- Be able to manage parent and caretaker user profiles under the childcare center.
- Group Communication with all parents and caretakers.
- View and manage care center details such as info, availability, news, etc.
- Post job vacancies for signing up new caretakers.
- Be able to extract various business intelligence reports.
- View and comment on user reviews

Scenario

As a childcare centre manager in Auckland, we cater to families with children aged six months to five years old. The facility is spacious, bright, and equipped with age-appropriate toys, books and learning materials. Center staff consist of trained and certified early childhood educators who are passionate about providing a nurturing and stimulating environment for children to learn and grow. As a childcare provider committed to inclusivity and support for all children, we assure parents that our childcare centre is dedicated to create an environment where every child can thrive. We invite every parent to tour the facility and discuss their Childrens' specific needs and preferences. During the tour, many children show a keen interest in the sensory corner, where children happily explore different textures and shapes. After the tour, parents can develop a personalized care plan for special need children. Together with the parents we can discuss the child's strengths, challenges, and individual learning goals.

Recently, I got so many calls from job seekers to inquire about the job vacancies. But with the current system I cannot upload the details to the system about the job vacancies. And unable to view the job details that are currently posted. Since, most of the things are handled manually recently child enrolment documents has got misplaced. Even though the document recovered successfully its better if can have some automated system. And some immediate emails that has sent regarding the last week holidays was not opened by the parents and most of them came across the childcare centre on the holiday. Because of that some leave updates were also collapsed and two of my teachers has taken holidays on the same date where the whole Center went miserable with the rest of the teachers.

Interview

Background: Mike Chen is a Childcare provider who has background history of being an experienced childcare center manager, with a passion for providing a caring surrounding for children of all ages. He is not only trained in Early Childhood Education but also in technology. One of his main responsibilities includes overseeing daily operations, managing staff, and maintaining compliance with regulations. He gets lots of emails from the parents as well as the job seekers. Due to his erratic schedule, it is difficult to manage the time to response to all since some of the work is still done manually. So, he is interested in creating a mobile app which helps him to equilibrium the administrative tasks and enhance communication with the parents to foster positive relationships with the families. The interview below is with Mr.Chen about the vision and creation of the app. One of our team members contacted him to do a contextual inquiry for such system.

Mr.Chen: Hi

Team Member: Thank you Mr.Chen for your time. Could you please describe briefly what you need in this app?

Mr. Chen: Yes. To be brief I mainly focused on an app to handle parent inquiries as I want every parent to be felt connected and give them update of the daily journal records. Apart from that if it could manage the administrative work, the work would be much easier.

Even though I have given you a brief context, the tasks are not that simple. From the start to the end of the day there are several inquiries from parents. Therefore, I must provide them with the improvements of each child. When it comes to the administrative staff, managing the staff and above all meeting the regulations of the ministry of health and Kindergarten Association is a must.

Team Member: Could you please tell me how your childcare center contacted the parents currently?

Mr.Chen: Mainly we used email to contact parents. But when it comes to enrolling and other administrative part it still handles manually. It is time consuming, and parents miss out on some of the important information. When it comes to the enrollment process, it goes up with the manual procedure. And of course, there are so many inquiries on enrolments. Specially from

the new immigrants. The brochures we have for the new enrollers are manual so anyhow they have to visit our center to get the information.

Team Member: What are the activities you handle, still managed manually?

Mr.Chen: Well, managing enrolments, scheduled and attendance management, Billing, staff management, curriculum planning, health and safety compliance etc.

Team Member: Tell me more about how do you envision this working?

Mr.Chen: Well, the app could help for a smooth-running of the relationship with parents. This may be both currently enrolled parents and the parents who seek childcare centers for their kids. For the parents, whose children are already enrolled can have immediate alert for any reminders and emergency situation. It would be great if could share the children's daily activities and achievements more interactively perhaps with photos, quick updates which aren't attainable through email.

For the parents who have not yet enrolled their children, they should be able to grab details about the childcare centers. And if it is possible, if parents are willing to enroll the child, enrolment procedures should also get control of the manual process.

Team Member: In addition to connecting and informing the parents, what are the other features do you like to have in the app?

Mr.Chen: It could be better, If the app can give a specific feature that can be helpful for the job seekers, who are giving so many calls and dropping off the CVs.

Meantime, if it can handle the care center details such as care center info, availability, news and generate business intelligence report will help me to minimize the administrative tasks and to come up with and keep the standards of ministry of education and kindergarten Association on childcare centers to operate productively.

Team Member: Thank you very much for your time. We will share the system design document once we finish our work on it.

Mr.Chen: I look forward to seeing it.

User Group 3: Caretaker Job Seekers

User Profile

1. **Name of Users:** Many users
2. **General Responsibilities or Activities:** User would use the website to:
 - Upload resumes, certifications, and other relevant documents.
 - View job postings and application requirements
 - Share qualifications and experience with potential employers
 - Manage personal profile and application history
 - Download job descriptions and related resources
3. **Computer Skills:** Low to Average
4. **Domain expertise:** Varies from low to average, depends on individual experience with job search and online platforms
5. **Type of system use:** Discretionary
6. **Goals:** how does this software tool help this user reach their goals?
 - To apply for job opportunities by easily uploading and managing relevant documents
 - To expose qualifications and experience with employer in a straightforward manner.
 - To access job postings and application details quickly
7. **Pain Points:** what nagging problems can this software help solve?
 - Job searchers want to upload their resumes and credentials so that they can be accessed from any device and apply for employment
 - Simplifying the process of sharing qualifications with employers while avoiding unnecessary storage
 - Quick access to job posts and related information is required to stay update with available opportunities
8. **Usage Contexts:** This application will be used on range of devices including home computers, workstations and mobile devices. Job seekers will often access the app on though downloaded mobile app or web browser.
9. **Software Ecosystem:** Integration with email services, web browses
10. **Collaborators:** Care center admin
11. **Frequency of Use:** Low to medium, depending on active job seeker's status

Persona



Name: Rianna Bowley

User Role (based on user profile): Early Childhood Educator – Job Seeking

Gender: Female

Age: 27

Education: Bachelor's Early Childhood Education

Location: Auckland, New Zealand

Disability: None

Quote:

“Finding the right childcare centre that aligns with my teaching qualifications and values”.

Computer Literacy:

High Moderate Low None

Application Expertise: (*knowledge of similar systems*)

High Moderate Low None

System Expertise: (*knowledge of a particular system and its methods of interaction*)

High Moderate Low None

Task Expertise: (*Level of knowledge of job and job tasks*)

High Moderate Low None

Frequency of use: (*how often is this type of user likely to use this software?*)

All the time Occasionally Seldom (once or twice a month) Very seldom (once or twice a week).

Attitude (feeling toward job or system):

Positive and proactive regarding the usage of digital resources for job search process, however concerned about effectiveness of those platforms to convey experience and ability of job seekers to employers.

Backstory (including motivation and pain points):

Rianna recently graduated with a Bachelor's Early Childhood Education and is excited to begin her career in early childhood education. She is dedicated to establishing inclusive, entertaining, and educational environments for children. Rianna is seeking for a job opportunity that not only provide a supportive and innovative working environment, but also allow them to have a significant impact on children's early development. She is interested in utilizing digital platforms that can effectively expose her educational qualifications, skills, experience, and personal interest to potential employers.

Primary activities this user will engage in:

- Create an account.
- Explore and apply to job openings at childcare centers through the mobile app.
- Showcase her educational background and teaching experience to potential employers.
- Receive notifications about job opportunities that match with profile and preferences.
- Connect and communicate with childcare center admin for job interviews.

Scenario

Rianna recently graduated from university with Bachelor's Early Childhood Education with flying colours and now seeking for perfect job opportunity where she can put her skills and enthusiasm to use. She is a passionate individual with a heart dedicated to nurturing and educating young minds. She begins her job search by researching various Early Childhood Education Centers, schools, and daycare facilities in her area. She explores their philosophies, curriculum model and staff requirements to find the best fit for her skills and values. Armed with this information, she updates her resume and creates a compelling cover letter highlighting her passion for working with young children and her relevant experience. Understanding the importance of networking, in the field of education, she reaches out to her professors, mentors and former colleagues for an advice and job leads. She attends professional development workshops, seminars and conferences related to early childhood education to expand her network and stay updated on industry trends. She also engaged with the online communities and forums dedicated to educators to seek advice and share her experiences.

Rianna thinks that it is really take times when searching for a job. Going for each childcare centre page and their carrier opportunities and compare the requirements for the job with the qualification she had taken more time. Uploading resumes for the job seeking pages and define cover letters to each job is an uninteresting job task. She must match the qualifications as well as the location of the care centre as she recently applied for a job and after she received an invitation for the interview only, she got to know that to reach the care centre she must go for more than 30km per day. She needed to keep track of the job vacancies she has applied as she has applied them from several pages and when the job recruitment agencies contacted her, she finds it exceedingly difficult to identify from which care centre they are contacting her.

Interview

Background: Rianna is an early childhood educator that recently graduated with a Bachelor of Early Childhood Education. She is so enthusiastic to establishing inclusive, entertaining, and educational environments for children. Rianna is seeking for a job opportunity that not only provide a supportive and innovative working environment, but also allow them to have a significant impact on children's early development.

The interview below is with Rianna regarding the vision and creation of the system. Miss KK is the member of the Tiakki Kiddos team contacted to do background inquiry for such a system.

Rianna: Hi and welcome Miss KK.

Team Member: Thanks for your time, Miss. Rianna. Can you briefly explain the requirements you have for this system?

Rianna: Yes, I'm looking for a system that I can find childcare center for job vacancies that orients with my teaching qualifications and values. Most of the times when I was searching, I found out common details about childcare centers, not the vacancies and the requirements which I needed to apply for the employment there.

Team Member: Could you please tell me; how did you search for job vacancies usually?

Rianna: Normally I used digital resources to search for the job vacancies. But concerned much more about convenient platform for applying for those.

Team Member: Tell me more about how do you intend a mobile app to overcome your problem?

Rianna: I would like to have a single platform for search and applying for the job vacancies which requires matching qualifications of mine. It would be much easier to me, if I get notifications about the new job opportunities that match my preferences.

Team Member: Do you have any privacy concerns about this system?

Rianna: Yes of course, I prefer to keep highly private my personal details and qualifications.

Team Member: Thanks a lot for your valuable time. We will work on a series of design informing documents and share them with you.

Rianna: Great, I look forward to seeing them.

Appendix B

User Stories

User Story 01

Title:	Priority:	Estimate:
Manage Billing Information	High	20 hrs
User Story: As a professional parent, I want to be able to pay childcare fees and manage billing information through the platform.		
Acceptance Criteria: Given a parent user logged into the platform, when I navigate to the billing section and select the option to pay childcare fees, Then I should be presented with a secure payment gateway where I can enter payment details and successfully complete the transaction.		

User Story 02

Title:	Priority:	Estimate:
Enrollment of first child	High	20 hrs
User Story: As a new parent I want to enroll my first child into the childcare center through the application.		
Acceptance Criteria: Given a create account option, I can then feed all information required and enroll my child and get an admission number.		

User Story 03

Title:	Priority:	Estimate:
Search for centers	High	20 hrs
User Story: As a new immigrant parent, I need to search for a childcare center.		
Acceptance Criteria: It is needed to select the area of preference and the center among many options registered and available. No. Of seats available and the profiles of teachers should also be visible once a center is chosen.		

User Story 04

Title:	Priority:	Estimate:
Report visibility	High	20 hrs
User Story:		
As a general parent, I require daily reports of the child.		
Acceptance Criteria:		
Once logged in, you should show the child's profile and there should be an option to view the latest report sent under new messages. This should include whatever parents requested for viewing such as photos/videos or a general message from staff regarding a child's current update.		

User Story 05

Title:	Priority:	Estimate:
Food Preference	High	20 hrs
User Story:		
As a Parent I want to customize food menu according to my child		
Acceptance Criteria:		
Once logged in, there should be a place to enter any allergies the child has. Also, we should be able to choose if the child is vegetarian, non-vegetarian. If a parent wants to send food from home the respective option will be chosen.		

User Story 06

Title:	Priority:	Estimate:
Job search	High	40 hrs
User Story:		
As a caretaker I need to search for new employment around me.		
Acceptance Criteria:		
I should be given an account creation option and once logged in I can choose my preferred location and all centers with vacancies should be shown. Given the option of filling in an application form and submitting it, I should be able to track the status of application.		

User Story 07

Title:	Priority:	Estimate:
Payments	High	50 hrs
User Story:	As an existing staff, I require to view payment information	
Acceptance Criteria:	Given the option to log in to my account, I should be able to see my current and previous pay slips saved and worked hours information.	

User Story 08

Title:	Priority:	Estimate:
Courses	High	25 hrs
User Story:	As a caretaker I want to be able to access resources and training materials available to enhance my skills and qualifications.	
Acceptance Criteria:	Under the option courses, the available training materials should be shown so that I can complete step by step training necessary for my level as a caretaker. All my previously completed ones should be saved within my account.	

User Story 09

Title:	Priority:	Estimate:
Update profile - Qualifications	Medium	16 hrs
User Story:	As an existing staff I require to update my profile electronically without handing over physical documents.	
Acceptance Criteria:	Once logged in to my profile, an update option should be visible to edit my personal details at any time.	

User Story 10

Title:	Priority:	Estimate:
Feedback and Review	Medium	32 hrs
User Story: As a professional parent, I want to rate and provide feedback on my childcare center's services and staff.		
Acceptance Criteria: Given that I am logged into application and have access to the feedback and rating feature. Then I should be able to provide feedback and rating for any activity or any member of staff. When I submit my rating, it should be recorded for review page.		

User Story 11

Title:	Priority:	Estimate:
Post new job openings	Medium	24 hrs
User Story: As a management user, I want to post current job vacancies and availability metrics		
Acceptance Criteria: Given access to the management dashboard and when I navigate to the vacancies section then I should be able to insert new job vacancies with details like job title, job description, required qualifications and availability metrics and these posting should be visible to job seekers in that application. Additionally, I need to update and delete existing posts.		

User Story 12

Title:	Priority:	Estimate:
Handle staff attendance and schedule	High	12 hrs
User Story: As an administrator in Childcare Center, I want to be able to track and manage staff attendance and schedule through this application.		
Acceptance Criteria: Given access to the administration dashboard and when I navigate to the staff attendance and scheduling section, I should view calendar which display staff schedule. I should be able to create, edit and delete schedules and assign new tasks to staff members. Addition to that I need to track attendance recording and option to generate attendance reports.		

User Story 13

Title:	Priority:	Estimate:
Daily Time Keeping and verify In/out records	Low	8 hrs
User Story: As an employee, I want to record my in/out time daily, so that I can ensure the accurate record of daily time keeping		
Acceptance Criteria: Once logged into my profile, I should be able to see the recorded time in and time out for the working days, Then I would be able to accurately calculate the hours worked for the day and if any mismatch I can comment or inquire about it.		

User Story 14

Title:	Priority:	Estimate:
Employee empowerment: Managing Availability and Leave Options	Medium	16 hrs
User Story: As an employee, I want to have control of my availability and leave options, so that availability should be updated accordingly.		
Acceptance Criteria: Once Logged into my profile, should be able to view and modify the availability, leave options, and specify their preferred days and times for work, then if the employee needs to request a leave, should be able to choose the type of leave and specify the dates. They should receive a confirmation message indicating the request has been received and should be able to track the request's status.		

User Story 15

Title:	Priority:	Estimate:
Admin user notifications: Enhancing communication with users	High	32 hrs
User Story: As an Admin User, I want to send general notifications to the users, so that the users get the timely Update.		
Acceptance Criteria: Given the admin user logged into the system and wants to send a general notification, when admin navigates to the notification sending interface Then should deliver promptly to all selected recipients.		

User Story 16

Title:	Priority:	Estimate:
Mode of invoicing	Medium	16 hrs
User Story: As a parent I need to decide the mode of receiving invoices		
Acceptance Criteria: Given the option to do payments through the app, a section should be there to choose the preferred mode of receiving invoices like mail, text messages or through the app itself. Once selected, a confirmation message should pop up.		

User Story 17

Title:	Priority:	Estimate:
Generate reports	Medium	40 hrs
User Story: As a childcare center administrator, I want to generate reports on staff performance, enrollment numbers, and financial data, so that I can evaluate the quality of the staff and entire process of the childcare center.		
Acceptance Criteria: Given access to the administrative dashboard on the childcare center's system, when navigate to the reporting section, then the generated reports on staff performance, enrollment numbers, and financial data should be in exportable file formats such as pdf or excel for easy to share and analysis.		

User Story 18

Title:	Priority:	Estimate:
Document Review and Approval System for Childcare center job Applicants	Medium	16 hrs
User Story: As a childcare center administrator, I want to be able to review and approve uploaded documents from job seekers applying for positions at our center.		
Acceptance Criteria: Given the administrator access the document review dashboard, when selecting the document from the list, then document review dashboard should accurately reflect the status of each document and job seeker's application should be updated accordingly.		

User Story 19

Title:	Priority:	Estimate:
Appointments	High	20 hrs
User Story: As a professional parent, I need to manage and schedule appointments with the staff regarding parent teacher meetings.		
Acceptance Criteria: Having logged in to the section of scheduling appointments, time slots selection should be available. Upon selecting a preferred timing a confirmation notification should be visible. Cancelling and rescheduling options also should be available.		

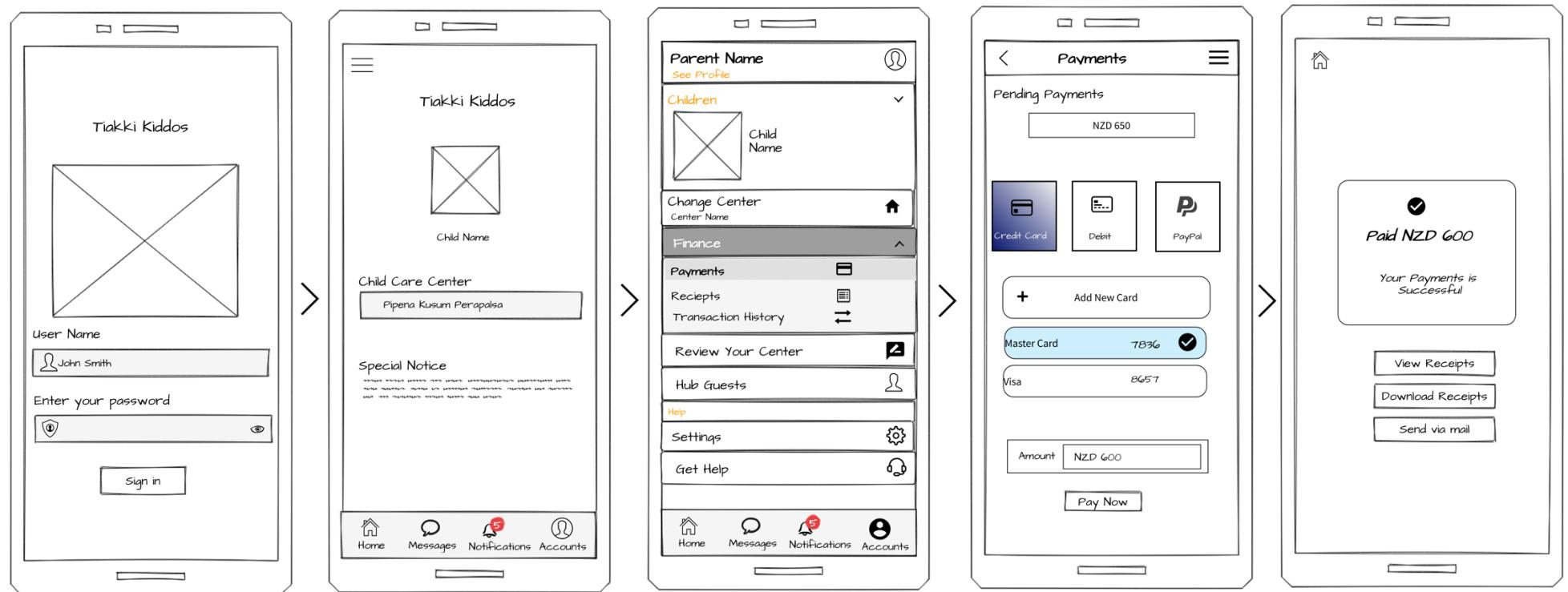
User Story 20

Title:	Priority:	Estimate:
Payroll Management	High	60 hrs
User Story: As an administrator I need to manage payroll.		
Acceptance Criteria: Once logged into the payroll section, should show me all employees who are eligible. Then I select payroll period after reviewing attendance records. App should notify if any errors are being made aligned with timesheet. The pay and hours worked should also be calculated automatically. After confirmation is done initiation should proceed.		

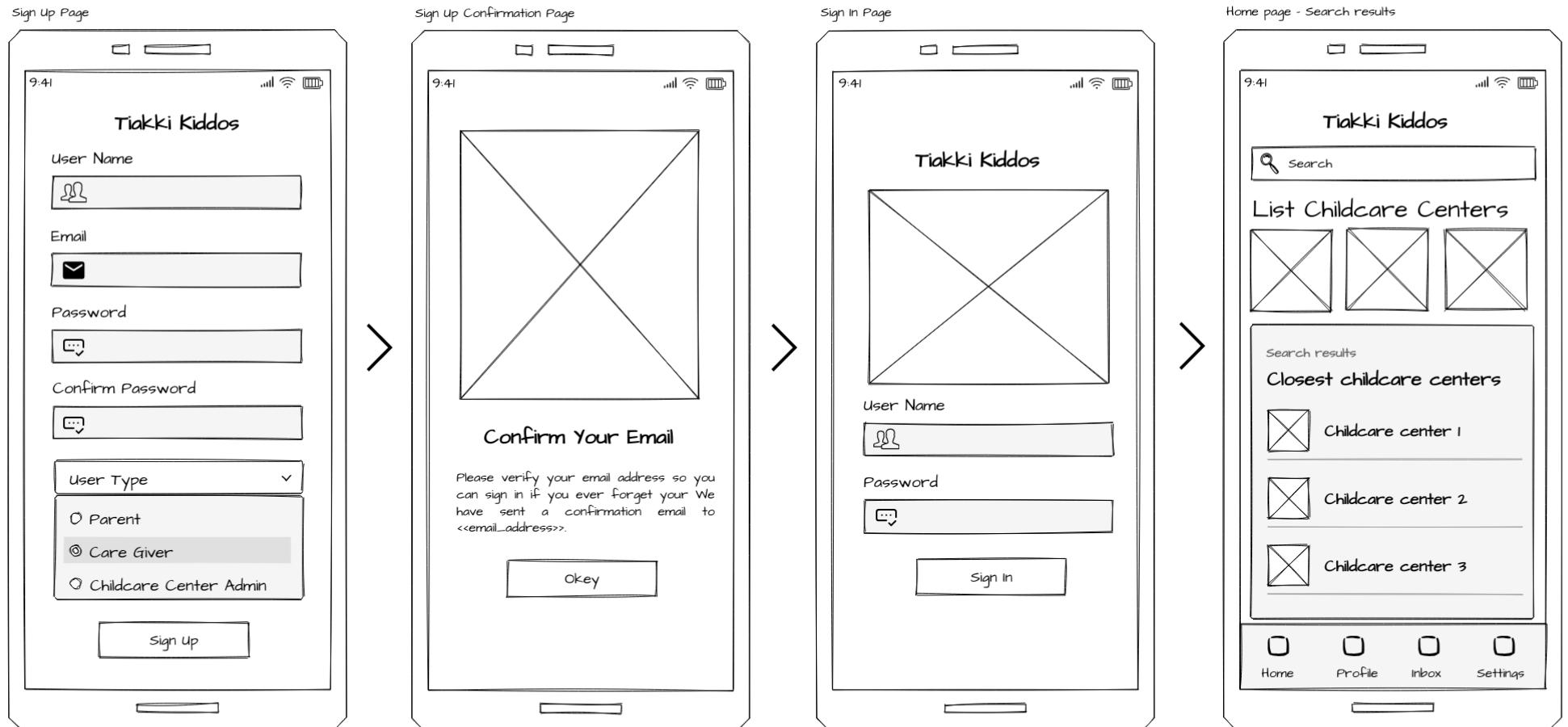
Low Fidelity Wireframes

User Group: Professional Parents

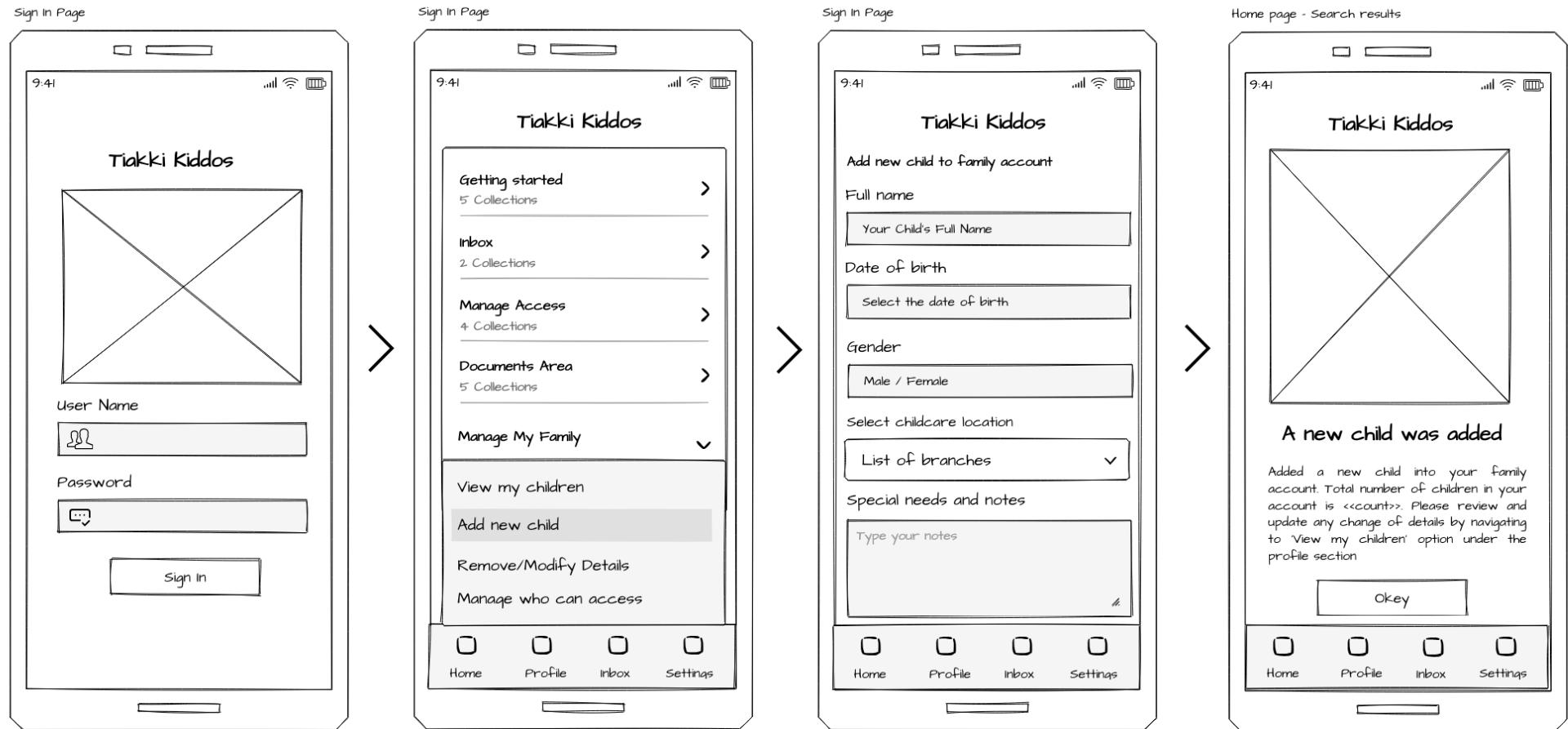
1. "As a professional parent, I want to be able to pay childcare fees and manage billing information through the platform."



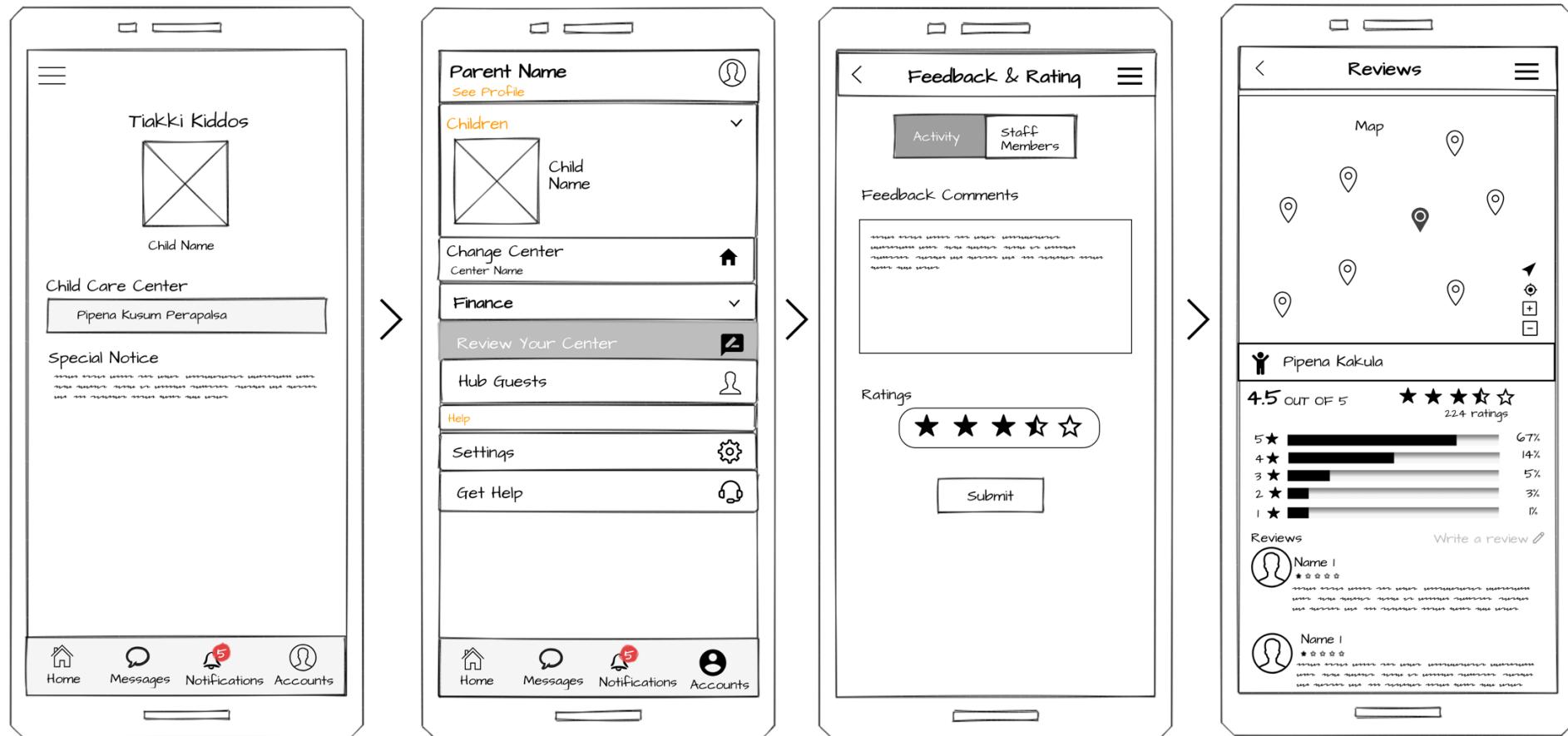
2. "As a new parent I want to enroll my first child into the childcare center through the application."



3. "As a new immigrant parent, I need to search for a childcare center."

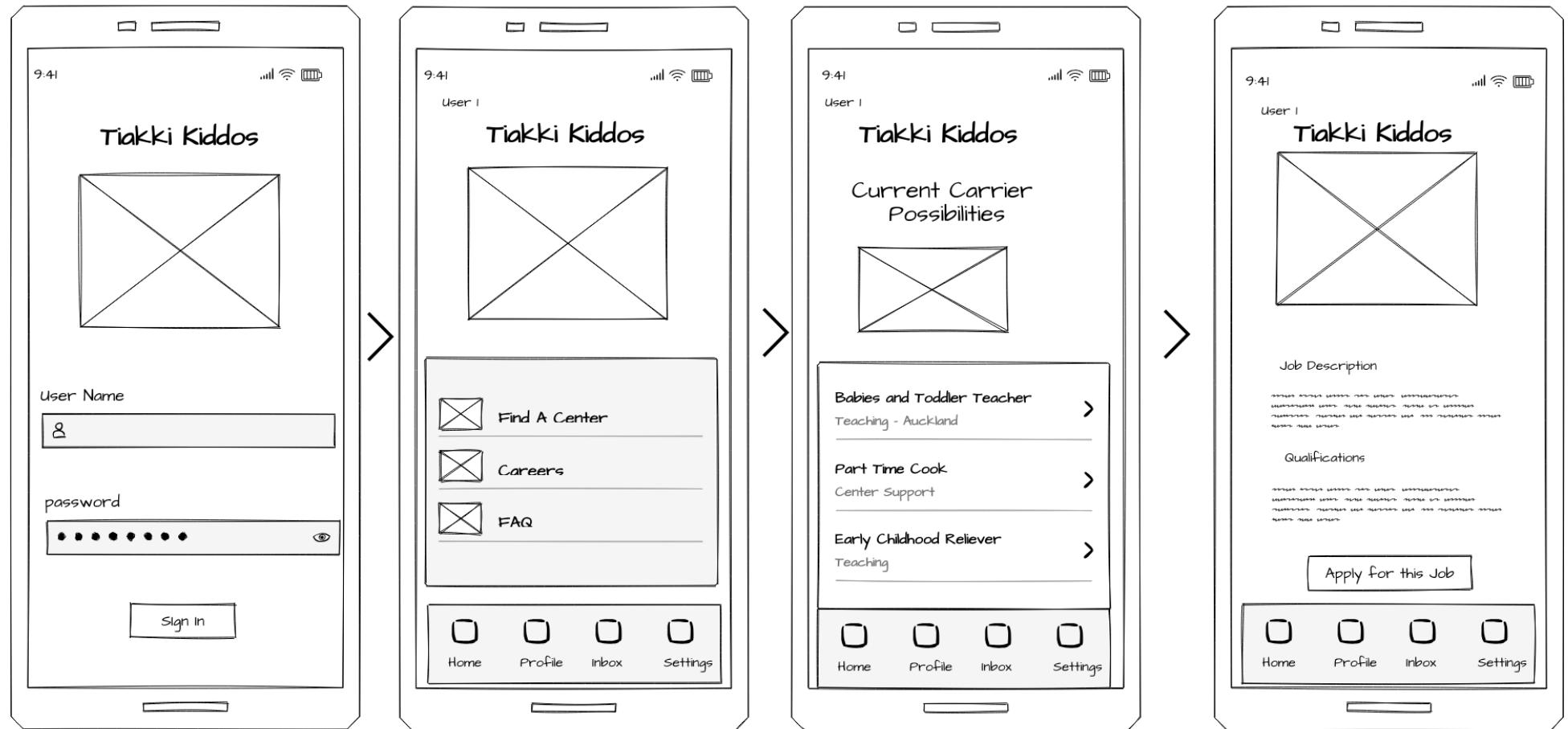


4. "As a professional parent, I want to rate and provide feedback on my childcare center's services and staff."

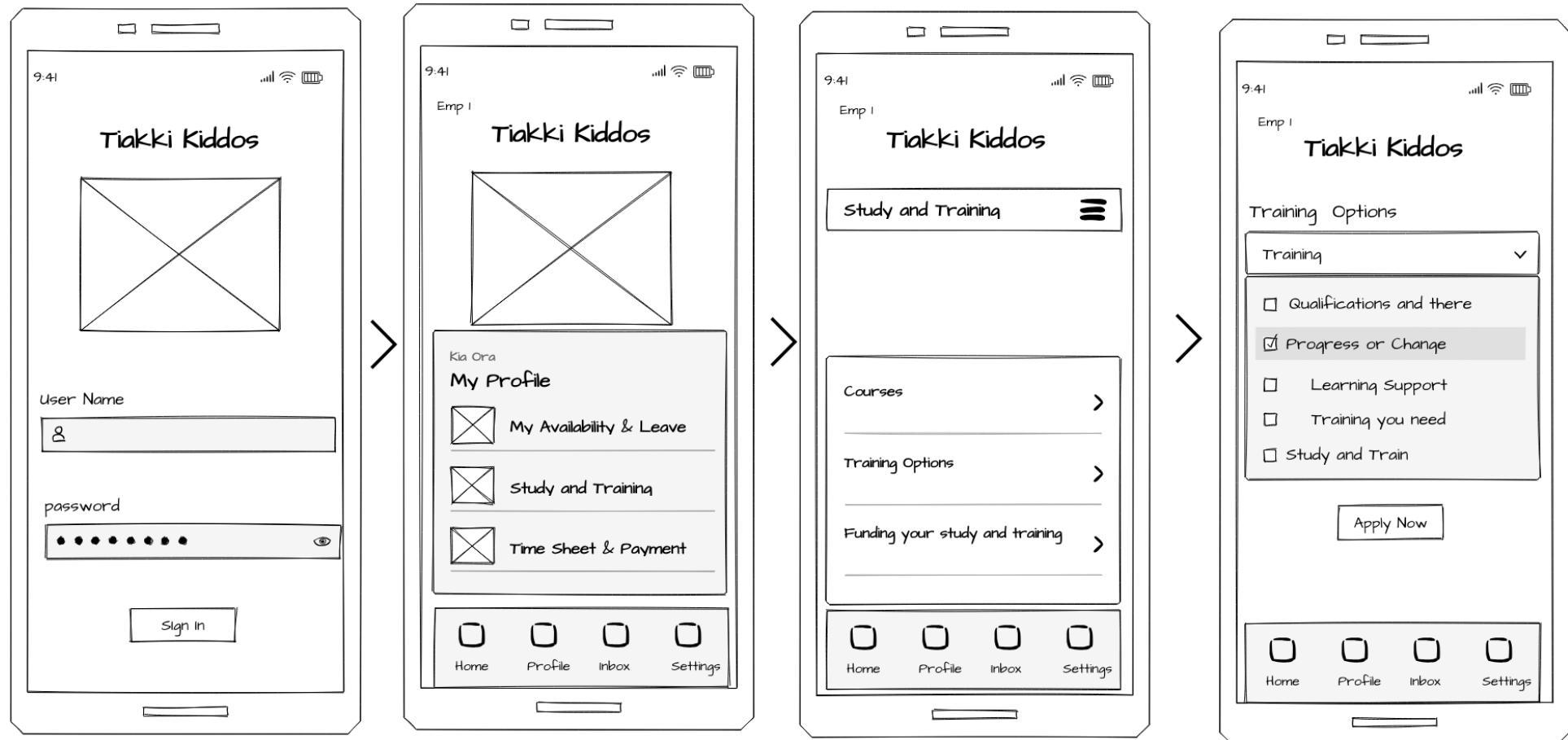


User Group: Caretaker Job Seekers

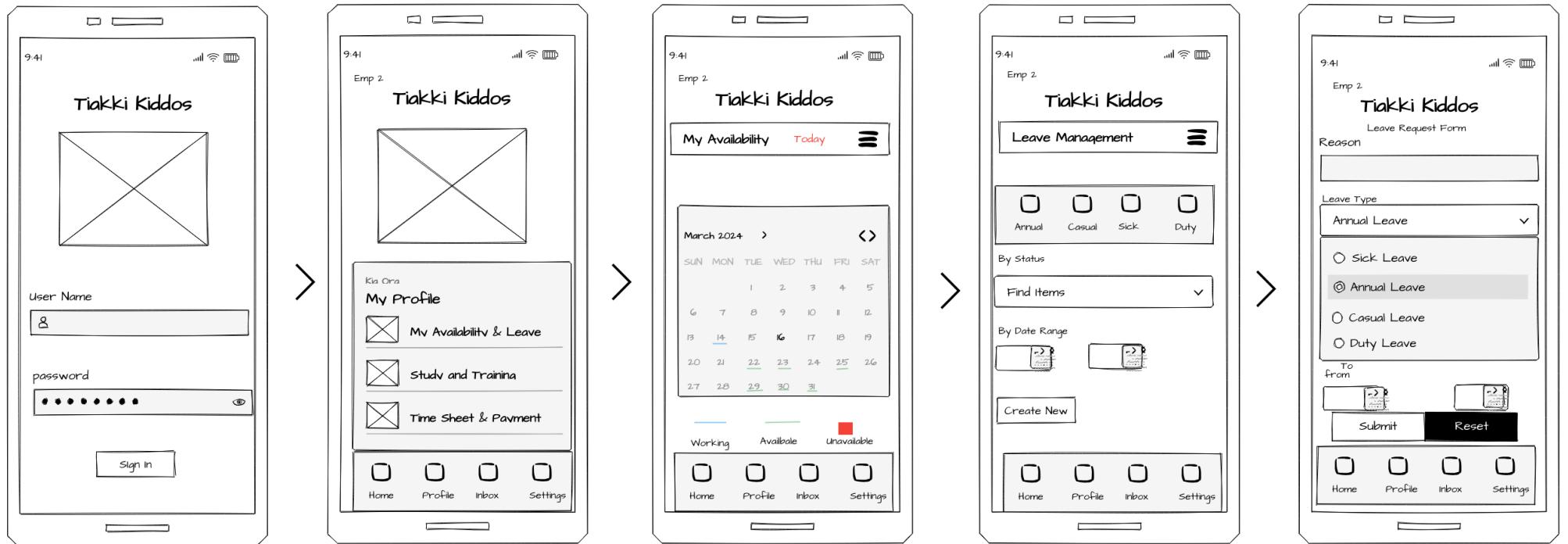
5. "As a caregiver I need to search for new employment around me."



6. "As a caretaker I want to be able to access resources and training materials available to enhance my skills and qualifications."

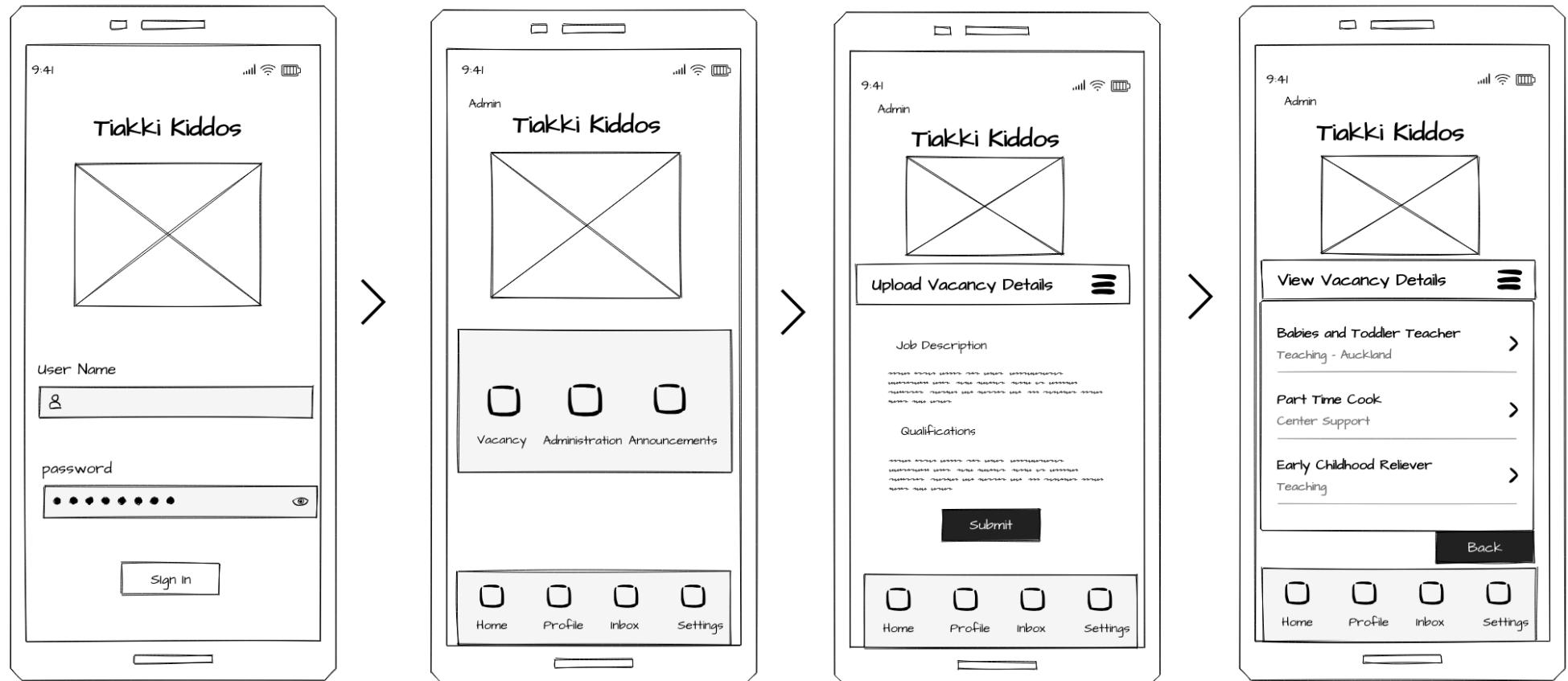


7. "As an employee, I want to have control of my availability and leave options, so that availability should be updated accordingly."

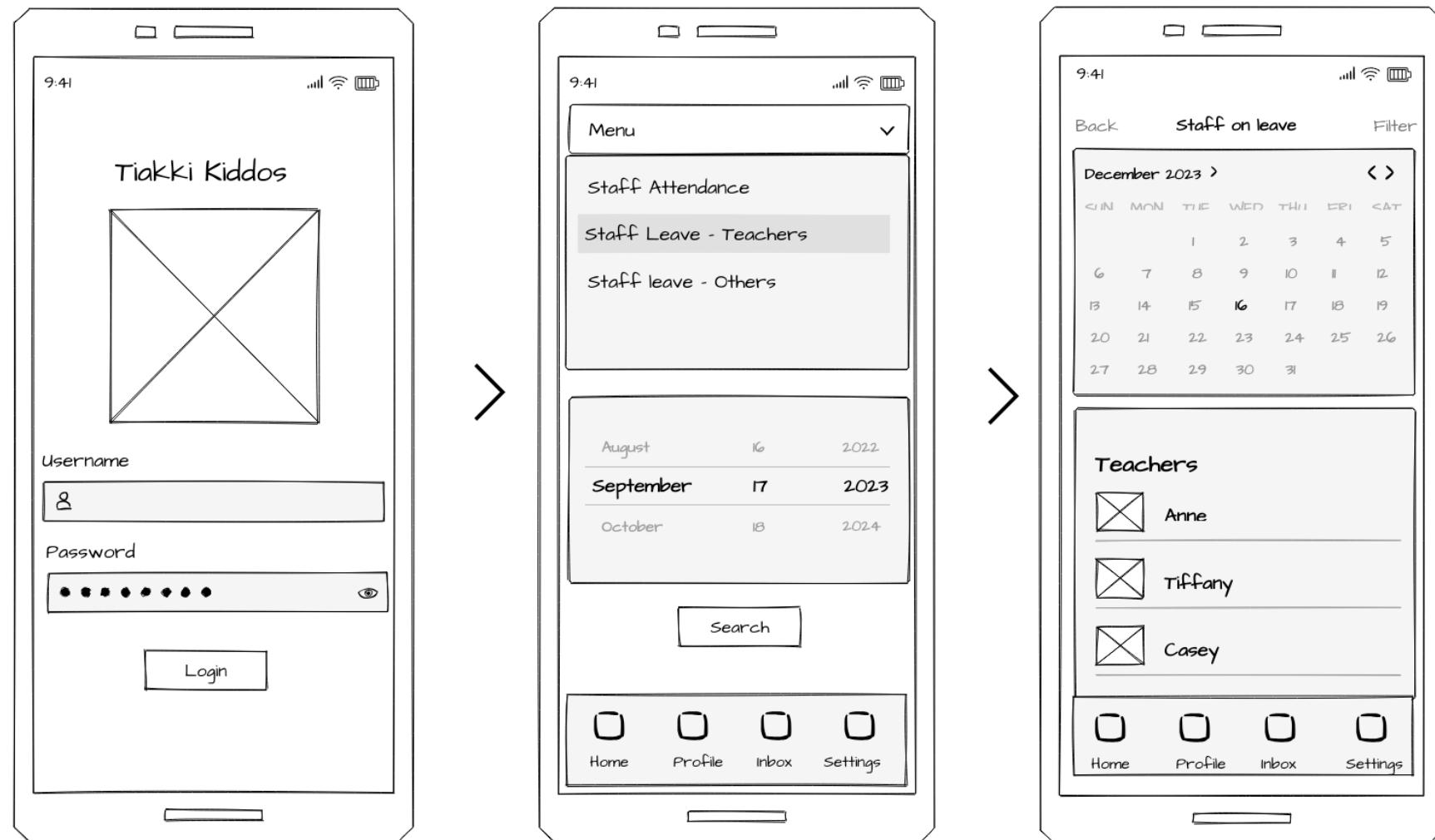


User Group: Childcare Provider

8. "As a management user, I want to post current job vacancies and availability metrics."



9. "As a administrator in Childcare Center, I want to be able to track and manage staff attendance and schedule through this application."



10. "As an Admin User, I want to send general notifications to the users, so that the users get the timely Update."

