FACULDADE DE ENGENHARIA DA UNIVERSIDADE DO PORTO



Bridging the Gap: Gamifying Family-Centered Care Education for Nurses

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Resumo

Os cuidados de enfermagem centrados na família desempenham um papel crucial na melhoria dos resultados dos cuidados de saúde, exigindo que os enfermeiros adquiram conhecimentos abrangentes sobre questões relacionadas com a família. Compreender a dinâmica e as complexidades das relações familiares permite que os enfermeiros prestem cuidados personalizados que considerem as necessidades e preferências únicas dos pacientes e das suas famílias. Para facilitar a interação e colaboração eficazes com as famílias, os enfermeiros precisam de uma compreensão sólida da dinâmica familiar e das habilidades para navegar e apoiá-los em situações desafiadoras.

Nos últimos anos, tem havido uma demanda crescente de abordagens de aprendizagem inovadoras e interativas. Os jogos sérios surgiram como uma solução promissora na educação na saúde, oferecendo experiências de aprendizagem envolventes e imersivas. Esta dissertação tem como objetivo desenvolver uma aplicação móvel para dispositivos Android utilizando a tecnologia React Native e a base de dados Firebase, incorporando elementos de gamificação para colmatar a lacuna existente no ensino de enfermagem sobre a dinâmica familiar e promover o conhecimento da avaliação e intervenção familiar.

Para apoiar o desenvolvimento do aplicatição móvel, uma revisão sistemática foi realizada para avaliar a eficácia dos jogos sérios no ensino de enfermagem. A revisão envolveu uma extensa pesquisa nas principais bases de dados, incluindo Scopus, PubMed, CINAHL e Web of Science. Critérios de inclusão focados em soluções de mHealth e eHealth relacionadas à educação familiar na saúde, com artigos publicados em inglês ou português. Foram excluídos os artigos que não abordaram suficientemente o problema ou ficaram fora do escopo.

Além disso, um formulário de feedback foi implementado como parte do processo de desenvolvimento do jogo para coletar feedback do utilizador sobre a sua experiência com a aplicação. Esse feedback valioso fornecerá informações para aprimorar a eficácia do jogo e a experiência educacional que ele oferece.

Aproveitando o poder da tecnologia móvel e da gamificação, esta dissertação procura colmatar a lacuna existente na educação de enfermagem sobre a dinâmica familiar, capacitando os enfermeiros com os conhecimentos e competências necessários para prestar cuidados integrais aos doentes e às suas famílias. As descobertas da revisão sistemática e o feedback do utlizador informarão melhorias futuras e contribuirão para o avanço de abordagens educacionais baseadas em jogos sérios na área da saúde.

Keywords: Cuidados de enfermagem centrados na família, jogos sérios, aplicações móveis, gamificação, educação em enfermagem

Abstract

Family-centered nursing care plays a crucial role in improving healthcare outcomes, necessitating nurses to acquire comprehensive knowledge about family-related issues. Understanding the dynamics and complexities of family relationships allows nurses to provide tailored care that considers the unique needs and preferences of patients and their families. To facilitate effective interaction and collaboration with families, nurses require a solid understanding of family dynamics and the skills to navigate and support them in challenging situations.

In recent years, there has been an increasing demand for innovative and interactive learning approaches. Serious games have emerged as a promising solution in healthcare education, offering engaging and immersive learning experiences. This dissertation aims to develop a mobile application for Android devices using React Native technology and the Firebase database, incorporating gamification elements to address the existing gap in nursing education on family dynamics and promote knowledge of family assessment and intervention.

To support the development of the mobile application, a systematic review was conducted to assess the effectiveness of serious games in nursing education. The review involved an extensive search of major databases, including Scopus, PubMed, CINAHL, and Web of Science. Inclusion criteria focused on mHealth and eHealth solutions related to family education in healthcare, with articles published in English or Portuguese. Articles that did not sufficiently address the problem or fell outside the scope were excluded.

Furthermore, a feedback form was implemented as part of the game development process to gather user feedback on their experience with the application. This valuable feedback will provide insights to enhance the game's effectiveness and the educational experience it offers.

By leveraging the power of mobile technology and gamification, this dissertation seeks to bridge the gap in nursing education on family dynamics, empowering nurses with the necessary knowledge and skills to provide comprehensive care to patients and their families. The findings from the systematic review and user feedback will inform future improvements and contribute to the advancement of serious game-based educational approaches in healthcare.

Keywords: Family-Centered Nursing Care, Serious Games, Mobile Application, Gamification, Nursing Education

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"That person who helps others simply because it should or must be done, and because it is the right thing to do, is indeed without a doubt, a real superhero"

Stan Lee

Contents

1 Introduction **1**
- 1.1 Motivation . . . 1
- 1.2 Problem definition and Objectives . . . 2
- 1.3 Document Structure . . . 3

2 Background **5**
- 2.1 Nursing in Portugal . . . 5
- 2.2 Family Health Nurses and their role in health promotion . . . 6
- 2.3 eHealth and mHealth . . . 6
- 2.4 Serious Games . . . 7
- 2.5 E-learning, Gamification and Serious Games for learning . . . 8

3 State of the Art **11**
- 3.1 Review methodology . . . 11
- 3.2 Research Outcomes and Insights . . . 12
  - 3.2.1 Santa Fé: Development of a Family Health Game . . . 15
  - 3.2.2 Family Nursing Game: Board Game . . . 15
  - 3.2.3 Game2FamilyNursing: Digital Game . . . 15
- 3.3 Final Remarks . . . 16

4 Methodology **17**
- 4.1 Project Specification . . . 17
  - 4.1.1 Target Audience . . . 17
  - 4.1.2 Requirements and scope . . . 18
- 4.2 Technology Selection: React Native with Expo . . . 19
- 4.3 Technology Selection: Firebase . . . 20

5 Development Process **23**
- 5.1 App Design . . . 24
  - 5.1.1 Mockups . . . 25
  - 5.1.2 Colors . . . 26
- 5.2 Implementation Phase . . . 27
- 5.3 Integration of Firebase . . . 28
- 5.4 Authentication . . . 29
- 5.5 Data Storage . . . 30
- 5.6 Question Categorization . . . 30
- 5.7 Scoring and Leaderboard . . . 31
- 5.8 Data Workflow and Communication . . . 32

5.9 Testing and debugging . . . 32

6 Results **35**
6.1 Application Showcase . . . 35
6.1.1 Name and Logo of the App . . . 36
6.1.2 Sign-In and Sign-Up . . . 37
6.1.3 Home Screen . . . 39
6.1.4 Profile Screen . . . 41
6.1.5 Glossary Screen . . . 42
6.1.6 Quiz Screen . . . 43
6.2 User Engagement and Feedback . . . 45
6.2.1 Methodology . . . 45
6.2.2 Response Rate and Users Background . . . 46
6.2.3 Feedback Analysis . . . 47
6.2.4 Recommendations for Improvement . . . 49
6.3 Limitations and Challenges . . . 49

7 Conclusions and Future Work **51**
7.1 Satisfaction of objectives . . . 51
7.2 Future Work . . . 52

A Category Questions **55**
A.1 Concepts . . . 55
A.2 Family Structure . . . 56
A.3 Family Process . . . 58
A.4 Family Nursing . . . 59
A.5 Family Assessment . . . 60
A.6 Family Intervention . . . 61
A.7 Clinical Cases . . . 63

B Google Forms Questions **67**
B.1 Consent . . . 67
B.2 Data . . . 67
B.3 Experience . . . 68
B.4 Application Evaluation . . . 69
B.5 Usability . . . 70
B.6 Motivation and engagement . . . 71
B.7 Others . . . 71

References **73**

List of Figures

2.1 Serious Games Context [1] 9

3.1 PRISMA flow diagram of the systematic literature review identification and selection process 12

5.1 Gantt chart with the division of tasks over time 23
5.2 Final Mockups 25
5.3 Color Palette used in the app 26

6.1 Logo 36
6.2 App Icon 37
6.3 Authentication Screens 38
6.4 Home Screen 40
6.5 Profile Screen 41
6.6 Glossary Screen 43
6.7 Overview of the Quiz Screen 44
6.8 Demographic Data of Survey Respondents 46
6.9 Usability Evaluation Results 47
6.10 Motivation Evaluation Results 48

List of Tables

3.1 Results obtained in the search 11
3.2 Characteristics of the results 13
3.3 Characteristics of the results (continuation) 14

6.1 Advantages and Disadvantages regarding learning with Nurture 49

Abreviaturas e Símbolos

EMR	Electronic medical records
UCD	User-centered design
FNP	Family Nurse Practitioner
UX	User Experience
UI	User Interface
UID	User Identification
XP	Experience Points
API	Application Programming Interface

Chapter 1

Introduction

Nursing education is an essential component of providing high-quality patient care. In order to effectively care for patients, nurses must continually update their knowledge and skills through ongoing education and training. In recent years, there has been a growing interest in using innovative approaches to nursing education, such as serious games, to help nurses develop the knowledge and skills they need to provide the best possible care to their patients.

Serious games are a type of game that is specifically designed for the purpose of education or training, rather than solely for entertainment. These games can take many different forms, including video games, board games, virtual reality experiences, and more. They can be played on a variety of platforms, including computers, consoles, and mobile devices. One of the key benefits of serious games is that they can provide an immersive and interactive learning experience that can be more engaging and effective than traditional methods of teaching.

Understanding family dynamics is an important aspect of nursing education, as family dynamics can have a significant impact on a patient's health and well-being. Nurses who are knowledgeable about family issues are better equipped to provide patient-centered care that considers the unique needs and preferences of each patient. They are also more likely to be able to effectively communicate and collaborate with family members, which can be crucial for the patient's care and recovery.

There are several potential benefits of using serious games to teach nurses about family dynamics. For example, serious games can help improve patient outcomes by providing nurses with the knowledge and skills they need to understand and support a patient's family. In addition, serious games can promote lifelong learning by providing an engaging and interactive way for nurses to learn about important topics regarding family dynamics. They can also improve the retention of knowledge, as serious games can be an effective way to teach complex concepts and ideas.

1.1 Motivation

The motivation for this dissertation is to explore the potential of using serious games as a tool for teaching nurses about family dynamics and helping them provide the best possible care to their

patients.

Nurses play a critical role in the health and well-being of their patients, and it is important for them to have a good understanding of family dynamics to provide patient-centered care that takes into account the unique needs and preferences of each person.

There is a growing body of research on the use of gamification in a variety of settings, including education, healthcare, military, and corporate training. However, there is limited research on the use of serious games specifically in nursing education, and more research is needed to understand the potential benefits and limitations of this approach.

By better understanding the role of serious games in nursing education, we can identify ways to optimize their use and further improve the quality of care provided by nurses.

Overall, this thesis aims to provide a comprehensive examination of the use of serious games in nursing education, assess their potential as a tool for improving patient outcomes and enhancing patient-centered care, and finally create a game that encourages and helps family nurse practitioners to complement their education about family topics.

1.2 Problem definition and Objectives

In the last few years, have been a major structural change in society and family and with this, comes a necessity to better know how these changes have impacted the structure and functions of the family. Consequently, many nurses feel the need for more education regarding family issues.

Nursing education in some countries may not keep up with societal changes and may not adequately prepare students for the challenges they will face in the workplace.

As a result, nurses may rely on their personal experiences caring for their own families when interacting with patients' families. However, this informal learning may not provide sufficient training in this area, leading some nurses to neglect the importance of specialized education in family care [2].

Nursing education is an ongoing process that requires nurses to continuously update their knowledge and skills in order to provide the best possible care to their patients. Family dynamics can have a significant impact on a patient's health and well-being, and it is important for nurses to have a good understanding of family issues to provide the best care to the patients.

Traditional methods of teaching regarding family issues and dynamics, such as lectures and written materials, may not be effective. Nowadays, people are looking for innovative, stimulating, and iterative learning methods, and it is in this area that serious games have their advantages. Serious games can fulfill these characteristics because they are experimental and can provide regular feedback that motivates, strengthens skills, and promotes collaboration. From the literature, the first nurses interested in games as an instructional strategy date back to the early 1980s [3].

For this reason, this thesis aims to address the evolving landscape of healthcare education by leveraging advancements in technology and online learning methods. The primary objective is to design and develop an engaging and effective game that specifically caters to nurse family practitioners, equipping them with comprehensive knowledge and skills related to family issues

and dynamics. The mobile app will serve as an instructional tool, facilitating the understanding and support of patients' families.

In addition to the game development, this thesis will evaluate the game's effectiveness in enhancing the knowledge and skills of nurse family practitioners. Through careful assessment and analysis, the study will measure the impact of the game on the participants' understanding and application of family-centered care principles. The findings will provide valuable insights into the potential benefits and limitations of using serious games in nursing education.

Furthermore, this research also aims to identify any challenges encountered during the development and implementation of the game. By highlighting these challenges, the study will offer recommendations and solutions to overcome them, ultimately optimizing the game's usability and effectiveness as an educational tool.

This is a dissertation that is relevant to the field of nursing because it sets a benchmark for innovative advanced nursing practice and can identify the need for institutional support and continuing education for family nurse practitioners.

1.3 Document Structure

This document contains 6 more chapters besides the present chapter which is Introduction. On Chapter 2 it will be presented the background information related to nursing in Portugal, highlighting the importance of addressing family dynamics in healthcare. The concept of serious games is introduced, along with an explanation of why serious games are used as an instructional strategy. Chapter 3 presents a comprehensive literature review, focusing on existing studies, research, and relevant publications related to the use of serious games in nursing education. It explores the effectiveness of serious games in enhancing knowledge and skills among healthcare professionals. In Chapter 4 it is described the project specification, which includes defining the target audience and identifying the specific requirements for the mobile application and also the technologies used. On Chapter 5, the development process of the mobile application is discussed in detail. It provides an overview of the game design, implementation phase, integration of Firebase for data management, user authentication, data storage, and the overall data workflow and communication within the application. Chapter 6 encompasses the application showcase, where the features, functionalities, and design aspects of the finalized application are presented. User feedback and evaluation results are discussed, highlighting the strengths and limitations of the application. This chapter also addresses the challenges encountered during the development process. Finally, Chapter 7 summarizes the findings of the study, assessing the extent to which the research objectives have been achieved. It reflects on the satisfaction of objectives and discusses the implications and potential future work in the field of nursing education using serious games.

The thesis is supplemented with references, providing a comprehensive list of cited sources throughout the document. Appendices are also included to provide additional information, such as the survey questionnaire used for gathering user feedback.

Chapter 2

Background

This chapter discusses some theoretical aspects that are important for understanding the context in which the work is situated.

2.1 Nursing in Portugal

In Portugal, nurses are regulated by the Order of Nurses (Ordem dos Enfermeiros), which is responsible for setting standards and guidelines for nursing practice, education, and professional development. Nurses in Portugal must be registered within the Order in order to practice nursing.

To become a nurse in Portugal, individuals must complete a nursing program at a recognized educational institution and pass a national licensing exam. Nursing programs in Portugal typically take 3-4 years to complete and cover a wide range of subjects, including anatomy and physiology, pharmacology, nursing skills and techniques, and patient care.

Once they are registered with the Order, nurses can work in a variety of settings, including hospitals, clinics, nursing homes, and private homes. They may work with patients of all ages and with a wide range of health conditions and may be responsible for assessing patient needs, developing and implementing care plans, administering medications, and educating patients about their health conditions.

Community Nursing, Medical-Surgical Nursing, Rehabilitation Nursing, Child and Pediatric Health Nursing, Maternal and Obstetric Health Nursing, and Mental and Psychiatric Health Nursing are the specialties currently recognized by the Order. The Community Nursing specialty includes two areas: Community Health Public Health Nursing and Family Health Nursing. The specialty in Medical-Surgical Nursing includes four areas of specialty: Nursing for the Person in a Critical Situation, Nursing for the Person in a Chronic Situation, Nursing for the Person in a Palliative Situation, and Nursing for the Person in a Perioperative Situation [4].

2.2 Family Health Nurses and their role in health promotion

Family Health Nurses are healthcare professionals who are trained to provide primary care and support to individuals and families across the lifespan. They may also be referred to as family nurse practitioners (FNPs) or primary care nurses.

One of the key roles of family health nurses in health promotion is to help patients understand and adopt healthy behaviors that can prevent illness and promote overall health and well-being. This involves educating patients about healthy lifestyle behaviors, such as maintaining a healthy diet, exercising regularly, and avoiding tobacco and excessive alcohol use. Family health nurses also provide screenings and other preventive care services to help identify and address potential health issues before they become more serious.

In addition to providing preventive care and health promotion services, these professionals also play a key role in managing chronic conditions and coordinating care for patients with complex healthcare needs. They work closely with patients to develop care plans that meet the individual needs of each different person and support them in achieving their health goals.

2.3 eHealth and mHealth

With the advanced in technology, terms like eHealth, mHealth, telehealth, and telemedicine are terms that the digital health world deals with every day. They each represent a different aspect of technology and healthcare.

Both mHealth and eHealth play a role in supporting healthcare through electronics. They perform similar functions, but the main difference is how the information is delivered.

eHealth, or electronic health, refers to the use of electronic technologies to support the delivery of healthcare services. eHealth technologies include a wide range of tools and systems, such as electronic medical records, telemedicine, electronic prescribing systems, and healthcare analytics.

Electronic medical records (EMRs) are digital versions of traditional paper-based medical records and are used to store and manage patient health information. EMRs can include a wide range of information, such as medical history, diagnoses, medications, test results, and treatment plans. The use of EMRs can help to improve the accuracy and completeness of patient information and can reduce the risk of errors and omissions in patient care.

Telemedicine is a type of eHealth technology that allows healthcare professionals to provide medical consultations and diagnoses remotely, using videoconferencing or other types of digital communication. Telemedicine can be used to provide care to patients who live in rural or under-served areas, or to patients who are unable to physically travel to a healthcare facility.

Electronic prescribing systems are computer-based systems that allow healthcare professionals to electronically send prescriptions to pharmacies. These systems can help to reduce errors and improve the efficiency of prescribing and dispensing medications.

Healthcare analytics are tools and techniques used to analyze and interpret large amounts of healthcare data. These tools can be used to identify trends, patterns, and relationships in healthcare data, and can help to improve the efficiency and effectiveness of healthcare services

mHealth, an acronym for Mobile Health, refers to the use of mobile technologies, such as smartphones and tablets, to deliver healthcare services and support health-related activities.

One of the key benefits of mHealth technologies is their ability to provide healthcare services and support to patients remotely, regardless of location. This can be especially useful for patients who live in rural or under-served areas, or who have mobility limitations.

Mobile apps are software programs that can be downloaded to a mobile device, such as a smartphone or tablet, and are used to support a wide range of health-related activities. These activities may include tracking and monitoring health data, such as exercise, sleep, or diet, or providing information and support for managing specific health conditions.

2.4 Serious Games

Serious games are interactive games that are designed specifically for the purpose of education or training. They are different from traditional games, which are typically designed for entertainment purposes.

This type of game can be used to teach a wide range of skills and knowledge and can be used in various fields such as education, healthcare, and the workplace. They can be an effective tool for engaging learners and providing a more interactive and immersive learning experience.

Serious Games can fall into diverse categories such as board games, card games, children's games, and video games.

Board games can be used as a form of serious games, particularly in education and training contexts, they can also be an effective tool for teaching and can be used to engage learners in a fun and interactive way. There are several benefits to using board games in serious games:

- **Engagement** — Board games can be an effective way to engage learners and make learning more enjoyable. They can be particularly useful for teaching abstract concepts or ideas in a more concrete and interactive way;

- **Collaboration** — Many board games require players to work together and communicate in order to achieve a common goal. This can be an effective way to teach teamwork and collaboration skills;

- **Decision-making** — Board games often require players to make strategic decisions in order to achieve their goals. This can be an effective way to teach decision-making skills and problem-solving;

- **Adaptability** — Board games can be adapted to teach a wide range of subjects and skills and can be tailored to different age groups and learning styles.

The same reasons can be applied to card games and children's games. Children's games are games in which a group of children get together and establish a set of rules that are not completely predetermined in order no create mechanisms that everyone can enjoy and participate in, so these games are all about social interaction and collaboration. During school time, many of the games that teachers distribute to children have educational value, at different levels and in different areas of human development.

A video game is an electronic game that is played on a computer or video game console and involves interaction with a user interface to generate visual feedback. As serious games, they can be used in a variety of ways:

- **Educational video games** — These are video games that are specifically designed to teach specific subject matter or skills. Educational video games can be used to teach a wide range of subjects, such as math, science, and language arts, and can be tailored to different age groups and learning styles;

- **Simulation games** — These are video games that simulate real-world scenarios or environments and are often used for training or educational purposes. Simulation games can be used to teach a wide range of skills, such as decision-making, problem-solving, and teamwork;

- **Serious games for health** — These are video games that are specifically designed to promote health or support healthcare-related activities. They can be used to educate patients about their health conditions, teach healthy behaviors, or support rehabilitation;

- **Serious Games for business** — These are video games that are designed to teach specific business skills or support business-related activities. They can be used to teach management skills, sales techniques, or teamwork.

2.5 E-learning, Gamification and Serious Games for learning

E-learning, gamification, and serious games are all methods of using technology to support learning and engagement. However, there are some key differences between these approaches:

- **E-learning** — refers to the use of electronic technologies, such as computers and the internet, to support and facilitate learning. E-learning can include a wide range of activities, such as online courses, webinars, and virtual classrooms. E-learning is typically more structured and formal than gamification or serious games and may be used to support traditional forms of education, such as lectures and readings. "So, simplifying, e-learning tools digitalize traditional books and add INTERACTION. Students don't only read what they have to learn, but interact with it and have an instant feedback about their work. Interaction makes learning more engaging and interesting. Students feel that they are the ones controlling the process" [1].;

- **Gamification** — Uses game design elements and techniques in non-game contexts, such as in business, education, or healthcare. The goal of gamification is to engage and motivate individuals to perform tasks or achieve goals. Gamification can be used to motivate employees to achieve business goals or to engage and educate students or patients. Gamification is typically more open-ended and flexible than e-learning or serious games, and may be used to support a wide range of activities and goals;
- **Serious Games** — They are interactive games that are primarily created for educational purposes. Serious Games can be utilized in a variety of situations, including education, healthcare, and the industry to teach skills and knowledge. Serious games are often more structured, focused on education and training, and may have more precise learning objectives and results than gamification.



Figure 2.1: Serious Games Context [1]

Chapter 3

State of the Art

This chapter provides an overview of the current state of the art in nursing education regarding family-centered care, with a particular focus on the use of technology, online learning platforms, and gamification. Firstly, the methodology employed in this research study will be presented, detailing the approach taken to investigate the research objectives. Following the methodology section, the discussion will delve into the results obtained from the data analysis.

3.1 Review methodology

A rigorous review of the current literature was done in order to create a good bibliographical analysis.

A systematic review is a type of literature review that uses a systematic and transparent approach to identify, evaluate, and synthesize the findings of all relevant research on a specific research question. It is a high-quality source of evidence in evidence-based practice

The review was conducted by searching Scopus, PubMed, CINAHL and Web of Science databases using the following query:

(("Game") OR ("gamification") OR ("mobile app") OR ("eletronic game") OR ("web app") OR ("video game") OR ("gamified") OR ("game-based") OR ("mobile application") OR ("website") OR ("serious-game")) AND (("Family nursing") OR ("Family Relationship") OR ("Family health")) AND (("education") OR ("educational") OR ("teaching") OR ("teach") OR ("Communication") OR ("Medical"))

The results of the query were the following:

Table 3.1: Results obtained in the search

Databases	Number of obtained results
Scopus	109
PubMed	74
CINAHL	15
Web of Science	34

In the first stage, the Rayyan Software Application [5] was used. Rayyan is a free, open-source software application that is designed to support systematic reviews and meta-analyses, and includes tools for data extraction, quality assessment, synthesis, and collaboration. The systematic review in this study was conducted following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines[6].

After cross-checking and eliminating duplicates, 183 articles were obtained. All articles that addressed the effectiveness of apps for teaching nurses about family, as well as articles that discuss the potential advantages and challenges of using apps for this purpose were included for screening. The articles that did not address apps for teaching nurses or did not target primarily nurses or nurse students were excluded. Therefore, articles that did not fully match the inclusion criteria or had any of the exclusion criteria, were removed from the study.

In the initial stages, the gathered records were checked by reading the title, after checking all titles, 169 records were excluded. Subsequently, the remaining 14 articles were screened by reading the abstract. with 3 articles being excluded here. Therefore, 11 articles were screened by reading the full text. Of these 11 articles, 4 of them were excluded. Hence, after the selection process, a total of 7 articles were chosen for review and detailed analysis in the following step. Figure 3.1 summarizes this process.

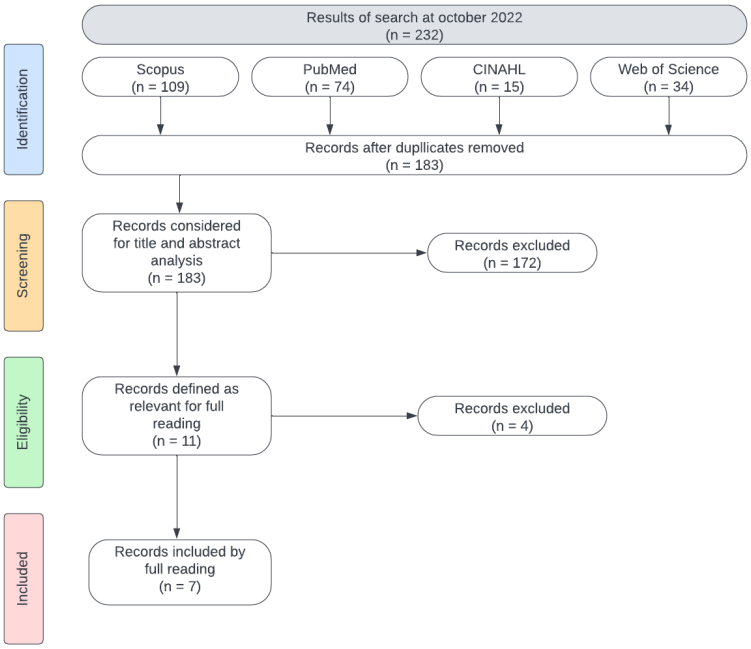


Figure 3.1: PRISMA flow diagram of the systematic literature review identification and selection process

3.2 Research Outcomes and Insights

Table 3.2: Characteristics of the results

Author (Year) Country	Title	Objectives	Method/Type of Study	Type of Game/Modality
Mackavey C, Cron S (2019) USA	Innovative strategies: Increased engagement and synthesis in online advanced practice nursing education	Assess the implementation of innovative strategies on the HESI examination scores.	Case presentations were created in an online program (Learning Management System) for each module, with associated game elements.	Web-based application. Case presentations were created in an online program (Learning Management System) for each module, with associated game elements. Self-assessment quizzes were presented in each module with some of them with youtube videos embedded.
Veneu ANS, et al. (2010) Brasil	The performance of the nurse: Orienting, Stimulating, and Educating through educational games.	Identify the use of educational games by nurses in the family health program and assess their difficulties in relation to this type of games.	Descriptive exploratory research, quanti-qualitative approach	
Tubelo R, et al. (2013) Brasil	Santa Fé: Building a Virtual City to Develop a Family Health Game	Qualify the professionals into using new teaching technologies and distance learning	In the fist place, the city was created in 2D then to manufacture the city in 3D the following software was used: Google Sketch up Pro 8.0, Corel DRAWN X5, XMind 2012, and eAdventure.	Creation of a city in virtual reality, simulating everyday situations such as clinical situations.

Table 3.3: Characteristics of the results (continuation)

Fernandes C, et al. (2014) Brasil/Portugal	Another way to teach family: family nursing game	Usability of a game to promote knowledge about family assessment and intervention.	Quasi-experimental study. It was done a bibliographic review of appropriate teaching methodologies on adults. A review of the contents related to the family was also done.	Board Game where the progress is determined by the capability of the player or team in answer right regarding family nursing contents.
Fernandes C, et al. (2016) Brasil/Portugal	Family Nursing Game: Developing a board game	Development of an educational board game for nurses to learn the content of family nursing within a hospital context.	The development of the educational tool followed the stages of Jaffe.	Development of a board game
Fernandes C, et al. (2022) Brasil/Portugal	Game2FamilyNursing: Study of a digital game to promote knowledge about family nursing	Perception and usability of a game to promote knowledge about family assessment and intervention.	There was a descriptive, cross-sectional study done.	Development of a APP with a quiz-type game for androids
Mueller R (2017) USA	Family Nurse Practitioners' Use of mHealth Apps for Health Promotion with Patients	Study to describe family nurse practitioners' intent to use and use of mobile health applications for health promotion	Research, data collection through electronic surveys	

3.2.1 Santa Fé: Development of a Family Health Game

It was made the creation of a virtual city that could serve as a setting for the student's actions in order to mimic the work routine of a healthcare system. The fictitious city was born from the formulation of clinical cases, in which each character had two distinct characteristics: work and home location, familiar context, disease's historic character, and psychological and physical characteristics. To add realism to the cases, Santa Fé was created from the standpoint of freedom in the creation of such characters, with appropriate local to each individual [7].

In short, an innovative educational project in health was developed in a 3D environment, tailored to local-regional conditions and using free technology. This project involved the creation of a virtual city and the implementation of an interactive game, which represents a departure from the static format of traditional distance learning platforms commonly used in Brazil. The game-based approach to education allowed the students to engage with the material in a more interactive way, using their previous knowledge to inform their learning and breaking away from the traditional model of education centered around the teacher's input. This type of approach also has the benefit of eliminating the need for travel and improving access to educational activities for primary healthcare professionals in various locations.

3.2.2 Family Nursing Game: Board Game

The researchers decided to develop didactic material, a board game, as a strategy for continuing the education of healthcare professionals, specifically to teach family nursing. The goal of the board game was to demonstrate to nurses the benefits of accompanying and visiting the families of hospitalized individuals by simulating means of intervention that support the family system, rather than just the individual patient.

The board game is intended to be an engaging and interactive learning tool that helps students acquire knowledge and skills, review content, increase attention, actively participate in the learning process and also promote interaction among students [3].

The researchers and creators of the project have concluded that the incorporation of games into the classroom has the potential to enhance student engagement and motivation and the results suggest that the use of games as a teaching tactic is effective in adult education. The Family Nursing Game, in particular, may be considered an optimal educational tool in this context.

3.2.3 Game2FamilyNursing: Digital Game

Game2FamilyNursing is a quiz-style game for Android. The themes of the game were adapted from the board game described above. The questions and categories of the Family Nursing Game, including concepts, family structure, family process, family assessment, family nursing, and family intervention, were incorporated into the game. Additionally, a new category called clinical cases was added to these topics [8].

3.3 Final Remarks

One thing that all of these results have in common as a conclusion is that "Gamification has a place in education to enhance engagement, motivation, and learning" [9]. Although one thing that was notable in a systematic review of the effectiveness of serious games on nursing education is that while the development of a sophisticated technology game program may offer improved graphics and entertainment for students like the one described in [7], the use of simpler serious game technology, such as quizzes and modifications to the learning management system, can also be an effective approach for nurse education. By incorporating game elements like competition and time constraints, this approach can effectively engage students and promote learning [10].

Chapter 4

Methodology

This chapter outlines the methodology employed in this dissertation to address the research objectives and investigate the development and effectiveness of the application for teaching nurses about family dynamics. The chapter begins with the project specification, which includes defining the target audience and identifying the specific requirements for the mobile application. This section clarifies the intended users and their needs, informing the subsequent stages of development and evaluation.

The chapter also explores the choice of appropriate technology. It discusses the justification for the selected technologies, including React Native and the Firebase database, and demonstrates how these technologies fit with the project's goals and specifications. To ensure the effectiveness and efficiency of the app, consideration is given to issues like usability, scalability, and compatibility during the selection process.

4.1 Project Specification

The primary objective of this dissertation is to provide a complementary learning tool for nursing education, targeting both students and practicing nurses. The game aims to facilitate knowledge recall, reinforce existing concepts, and introduce new ones, as nurses must continuously update their skills and understanding in the ever-evolving field of healthcare.

By incorporating interactive and engaging features, the game seeks to enhance user engagement, motivation, and knowledge retention. Through the use of gamification elements such as quizzes, progress tracking, and rewards, the game aims to create an immersive and enjoyable learning experience.

4.1.1 Target Audience

The target audience for the mobile app includes nursing students and practicing nurses in the field of healthcare. These individuals have a need to expand their knowledge and understanding of family dynamics and issues in nursing. The app aims to serve as a supplementary educational

tool for these professionals, providing them with a convenient and interactive platform to enhance their learning experience.

- **Nursing Students** — The mobile game targets students pursuing a nursing degree or similar healthcare programs. These individuals are in the process of acquiring foundational knowledge and skills in the field. The app will help them reinforce their understanding of family dynamics and develop critical thinking abilities related to family nursing.
- **Practicing Nurses** — The app is also designed for nurses already working in healthcare settings. These professionals require ongoing education and training to stay updated with the latest practices and research. The app will serve as a refresher tool, allowing them to review and expand their knowledge of family issues in nursing.

The target audience may vary in terms of age, experience level, and familiarity with mobile technology. As a result, the app needs to be simple to use, intuitive, and able to accommodate users with different degrees of technological expertise. Nursing students and working nurses should be catered to specifically, and it should provide them with compelling features and content that is pertinent to their learning process.

4.1.2 Requirements and scope

The previous studies [3] and [8] referenced in the previous chapter serves as valuables foundations for the project. The study focused on a game designed to educate nurses about family dynamics in healthcare. However, several limitations were identified during the evaluation. These included the absence of gamification elements, such as a scoring system and rewards, which could enhance user motivation. Additionally, there was a lack of a user login feature, and the game did not provide information on the remaining number of questions. The design was also criticized, with feedback suggesting the need for a glossary and improvements in the background music, which was found to be distracting.

Building upon these insights, the project aims to address these limitations and enhance the overall game experience. The incorporation of gamification elements, such as a scoring system, points, and rewards, will increase user motivation and engagement. Additionally, the inclusion of a user login feature will provide personalized experiences and allow for progress tracking. Information on the remaining number of questions will be provided to enhance user awareness and progress monitoring. Furthermore, efforts will be made to improve the design aesthetics, including the addition of a glossary and the selection of more suitable background music that promotes focus and immersion.

By considering the findings from the previous study and addressing the identified limitations, the goal was to create an improved game that effectively teaches nurses about family dynamics in healthcare while providing an engaging and user-friendly experience.

Furthermore, it is essential to employ an architecture that allows for easy modification and expansion of content. This is important to accommodate future needs such as updating or adding

new questions and creating additional elements within the game. By implementing a flexible and scalable architecture, the app can be easily adapted to incorporate any necessary changes or expansions, ensuring its long-term usability and relevance.

4.2 Technology Selection: React Native with Expo

Choosing the technology stack for app development required careful consideration of various factors. React Native combined with Expo emerged as the preferred choice for the development of the quiz-style app. This decision was based on the merits of the technology itself and the advantages offered by Expo.

React Native is an open-source framework developed by Facebook that enables developers to build cross-platform mobile applications using JavaScript. It allows for the creation of native-like user interfaces for iOS and Android platforms using a single codebase. React Native utilizes a declarative syntax and leverages a bridge that connects JavaScript code with native components, resulting in efficient and performant mobile apps. To gain a comprehensive understanding of React Native, thorough research was conducted, including exploration of the official React Native documentation[11] and various online resources such as Udemy course and youtube videos. This research enabled to leverage React Native's capabilities effectively and apply best practices in the development process. It follows a component-based architecture, which means that the user interface (UI) is built by assembling reusable UI components. This approach allows for code reusability, as components can be shared between different screens and even across platforms.

One of the key advantages of React Native is its use of JSX (JavaScript XML), which is a syntax extension that allows developers to write UI components using a combination of JavaScript and XML-like syntax. This makes it easier to define and manage the UI structure and layout.

React Native also introduces the concept of state and props for data management. The state represents the internal data of a component that can change over time, while props are properties passed down to child components. This allows for efficient data flow and enables the creation of interactive and dynamic user interfaces.

React Native was chosen as the platform for the development of this mobile game due to its particular ability to facilitate cross-platform code reuse. By utilizing a single codebase, the game could be deployed on both iOS and Android devices, ensuring consistent functionality and user experience across platforms. However, it is important to note that during the development process, certain iOS-specific features were not tested or incorporated into the game. This limitation arose from the absence of a suitable environment for testing iOS features, as the development was carried out on a Windows machine. Additionally, the unavailability of an iPhone device further hindered the testing process, as running an iOS emulator requires a macOS environment, which was not accessible at the time. Despite these constraints, the game was primarily designed to provide an enjoyable and engaging experience for Android users, while efforts were made to ensure compatibility with iOS devices to the best extent possible given the development limitations. Another advantage is the thriving ecosystem and community of React Native. The framework is

extensively used, and a sizable developer community actively participates in its development and offers support. This entails that developers have access to a multitude of tools, guides, and third-party libraries, all of which can greatly accelerate development and improve the functioning of the app.

This mobile quiz game was designed using React Native because of its performance, versatility, and efficiency. To effectively engage players, the game needed an intuitive user interface. The building of aesthetically pleasing and interactive interfaces that complied with the app's requirements was made possible by React Native's huge library of pre-built UI components and its support for custom UI elements. Furthermore, React Native's performance optimizations, such as asynchronous rendering, ensured smooth user interactions and a responsive experience. This was particularly important for this game, which relied on user input and timely feedback to provide an engaging and immersive experience.

In conjunction with React Native, Expo was chosen as a development toolset to streamline the app's development process. Expo provides a set of tools and services built around React Native, simplifying many aspects of app development and enhancing the developer experience.

This conjunction was chosen due to a number of its benefits. First of all, Expo offers a streamlined development environment that enables developers to set up a project and begin developing the app immediately. It does away with the need for laborious configuration and setup procedures, allowing developers to concentrate on the features and operation of the program right away. Expo also provides pre-configured native modules that grant access to device features like the camera and push notifications, reducing the need for extensive native code development. It should be noted, however, that in the case of this mobile game, the camera and push notifications functionalities were not utilized. This decision was made based on the specific requirements and scope of the project, as well as considerations regarding the target audience and gameplay mechanics. While Expo's camera and push notifications capabilities remain powerful tools, they were not relevant to the core functionality and user experience of the game being developed. As a result, the focus was directed toward leveraging other Expo features that were more aligned with the game's objectives and gameplay elements.

In conclusion, the decision to use React Native and Expo as the app's technological stack allowed for effective cross-platform development, a user-friendly UI, and increased developer productivity. The flexibility and performance of React Native, together with Expo's developer-friendly tools and services, allowed the app to be successfully constructed in order to provide a smooth and engaging user experience.

4.3 Technology Selection: Firebase

Firebase was chosen for the backend implementation, a powerful and scalable cloud-based platform developed by Google. Firebase is a Backend-as-a-Service (Baas). Provides a number of tools and services to assist developers in creating, scaling, and maintaining web and mobile apps. The Firebase database is particularly well-liked because it enables developers to release scalable

apps quickly.[12] Firebase is categorized as a NoSQL database program, which stores data in JSON-like documents.

NoSQL databases, often known as "not only SQL" databases, are non-tabular databases that store data in a different way than relational tables. Depending on the data model, there are many types of NoSQL databases. Document, key-value, wide-column, and graph are the primary types. They offer flexible schemas and scale well under heavy user loads and data loads[13].

JSON, or JavaScript Object Notation, is a human-readable data interchange format, specified in the early 2000s. JSON is entirely language-independent while being based on a portion of the JavaScript programming language standard. A string key is mapped to a value (which could be a number, string, boolean, array, an empty value, null, or even another object) in JSON objects, which are associative containers[14].

Chapter 5

Development Process

The present chapter provides a comprehensive insight into the various stages of the development process of the application, including app design, implementation phase, integration of Firebase, authentication, data storage, and data workflow and communication. This chapter serves as a roadmap, guiding through the key steps involved in creating an engaging and interactive learning experience for nurses.

One of the most common and effective methods of displaying activities (tasks or events) displayed against time is a Gantt chart, which is frequently used in project management. A list of the activities is located on the chart's left side, and a suitable time scale is located along the top. A bar is used to symbolize each activity, and the position and length of the bar correspond to the activity's beginning, duration, and finish dates [15]. To provide a visual roadmap of the development process, the following Gantt Chart illustrates the timeline and sequencing of the different development tasks.

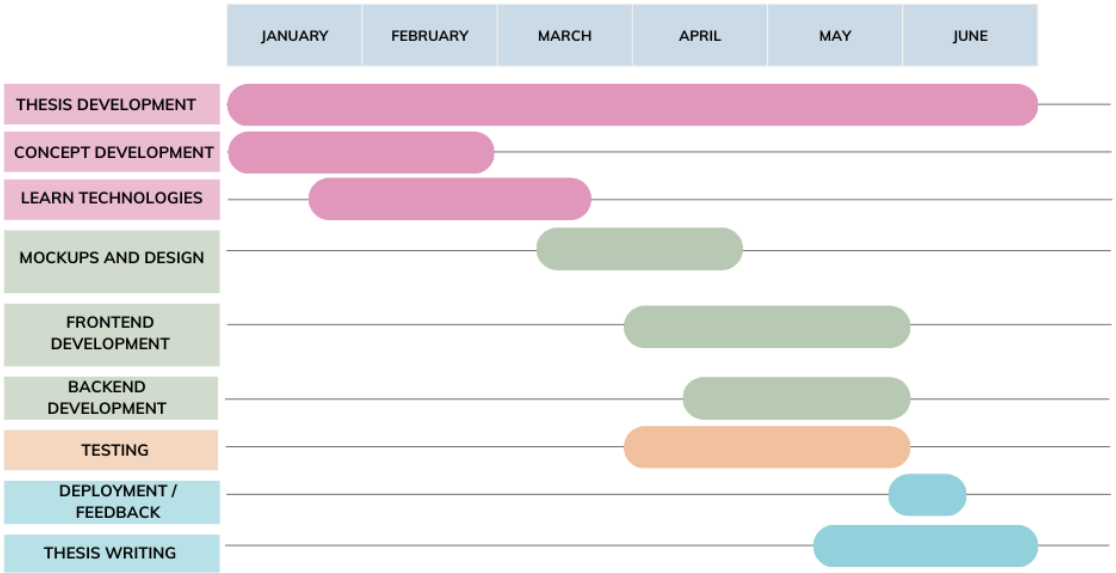


Figure 5.1: Gantt chart with the division of tasks over time

5.1 App Design

During the pre-production phase, the design of the app played a crucial role in creating an intuitive and engaging user interface (UI) that would enhance the overall user experience (UX). This phase involved several key steps, including wireframing and prototyping, which helped in visualizing and refining the app's layout, navigation structure, and visual elements.

User experience (UX) and user interface (UI) components are included in the continuing process of app design. Choosing how a user will use an app and developing a workable product are both steps in the UX Design process. Mobile app design concepts are created and tested during the UX process to ensure that all of the decisions will result in a functional app. Making an app appear attractive is the process of user interface design. The visual presentation of an app is chosen during the UI phase. Each screen a user sees must have a unified aesthetic appeal.[16]

Wireframing was the initial step in the design process, where rough sketches and low-fidelity representations of the app's screens were created. This allowed for the exploration of different layout possibilities and the arrangement of various UI components. These wireframes acted as a blueprint for the subsequent stages of design, providing a basic framework for the app's structure.

Based on the wireframes, the next step involved creating interactive prototypes using design tools like Figma. This allowed for a more detailed and realistic representation of the app's UI. The prototypes included the placement of buttons, menus, and other interactive elements, providing a more comprehensive understanding of the app's navigation flow and usability.

During the design phase, careful consideration was given to the app's layout and visual hierarchy. The aim was to create a visually appealing and user-friendly interface that would guide users through the app's features seamlessly. The placement and arrangement of elements were strategically planned to ensure ease of use and accessibility, with important information and actions given appropriate emphasis.

Furthermore, the selection of color schemes, typography, and visual styles played a significant role in creating a cohesive and aesthetically pleasing UI. Colors were chosen to evoke a sense of professionalism and calmness, aligning with the healthcare context of the app. Typography was selected for readability and clarity, ensuring that users could easily consume the content presented on the screens.

The navigation structure of the app was designed to be straightforward and intuitive, enabling users to navigate between different sections effortlessly. A bottom tab navigation pattern was implemented, providing easy access to key sections such as the Home Screen, Profile, and Glossary. This consistent navigation structure across the app ensured familiarity and reduced cognitive load for users.

Throughout the design phase, the focus was not only on the visual aspect but also on creating a positive user experience. Usability testing was conducted to validate the effectiveness of the design decisions. Although user feedback was not collected specifically for the design phase, the iterative nature of the development process allowed for continuous refinements based on user feedback gathered during the testing and debugging phase.

5.1.1 Mockups

To guide the design process and ensure a clear vision of the app's interface, rough mockups were created. These initial sketches, present in the 5.2 figure, served as a visual blueprint, allowing for the exploration of layout and navigation possibilities. While these mockups were not finalized designs, they provided a foundation for discussing and refining the overall app structure and visual elements.

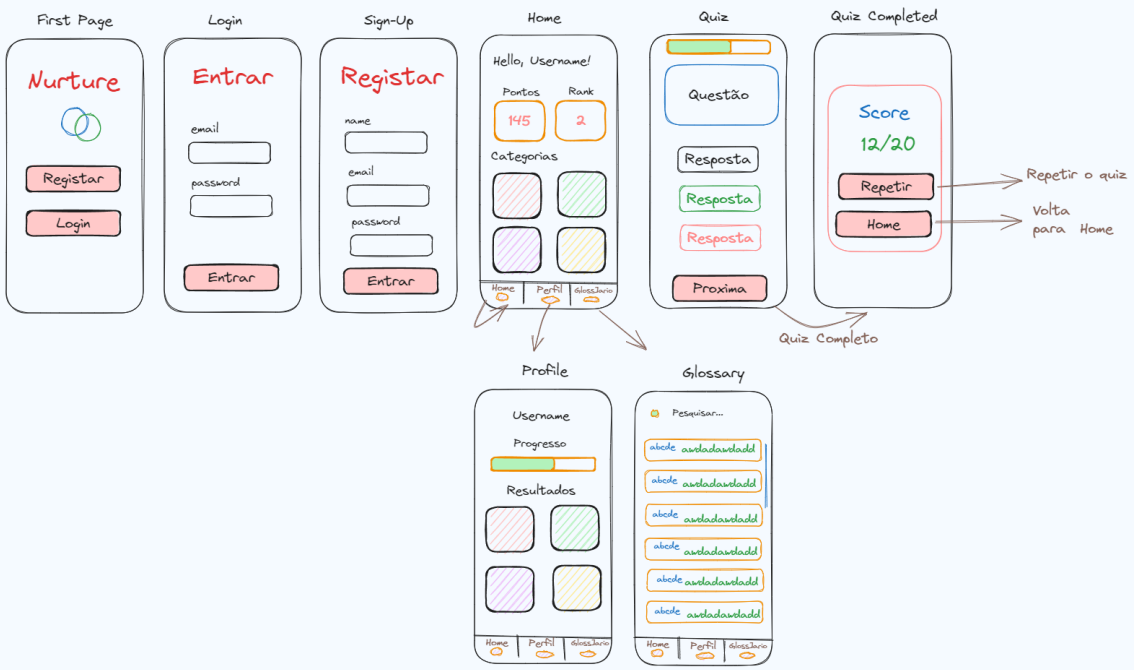


Figure 5.2: Final Mockups

The mockups were intentionally kept rough to focus on the core elements and screen flow rather than detailed visual aesthetics. They helped in determining the placement of essential components, such as buttons, text fields, and navigation elements. The sketches also assisted in visualizing the overall hierarchy of the screens and the user's journey through the app. It's vital to keep in mind that the mockups were created to give a general idea of the design direction for the app, and during the implementation phase, they were improved into high-fidelity designs. A common understanding of the app's structure and user flow was made possible thanks in large part to the mockups, which eventually informed the design choices.

The mockups outline a clear and intuitive layout and navigation structure for the app. The initial screen presents two buttons, one for registration and another for login, allowing users to access the app based on their account status. These buttons provide a straightforward entry point for new users to register or existing users to log in.

Once users log in, they are directed to the Home screen, which serves as the central hub of the app. The Home screen prominently displays the different categories of quizzes available for users to explore. These categories offer a selection of quizzes related to various aspects of family dynamics in nursing. By organizing quizzes into categories, users can easily navigate and choose

topics that interest them. In addition to the quiz categories, the Home screen also provides users with information about their points and rank. This allows them to track their progress and see how they compare to other users in terms of points and leaderboard ranking. This gamification element adds a competitive and engaging aspect to the app.

To ensure seamless navigation, a bottom navigation tab is present across the screens. This tab includes three main sections: Home, Profile, and Glossary. Users can easily switch between these sections to access different features and information within the app.

When users select a quiz category, they are taken to a dedicated quiz screen. This screen displays the progress of the quiz. Each question is presented along with multiple-choice answer options, allowing users to select their response. Upon completing the quiz, a modal appears, presenting the user's score and offering two options: the ability to repeat the quiz or return to the Home screen. This feedback loop encourages users to continue engaging with the quizzes and improve their scores.

The Profile screen provides users with an overview of their game progress. It displays information such as the total number of correct answers in each category, allowing users to monitor their performance and identify areas for improvement.

Lastly, the Glossary screen provides users with a collection of nursing-related words. Users can search for specific terms, supporting their learning and understanding of key terminology.

These conceptual mockups show a carefully considered navigation structure and layout that seeks to offer a user-friendly and interesting experience. A logical and fluid user journey is made possible by the quizzes' obvious structure, the inclusion of progress tracking, and seamless navigation across screens.

5.1.2 Colors

In order to create a visually appealing and cohesive user interface, careful consideration was given to the selection of colors for the app. The chosen color palette aims present in 5.3 to evoke a sense of professionalism, while also providing a visually engaging and intuitive experience for the users.

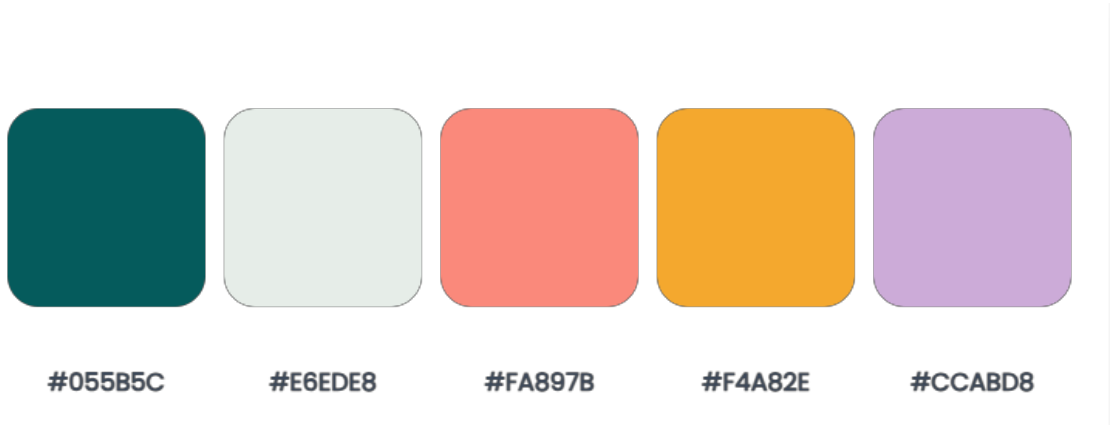


Figure 5.3: Color Palette used in the app

The primary color, #055b5c, was chosen to evoke a sense of professionalism and trust. This deep blue shade reflects the calm and reliable nature of the nursing profession while conveying a feeling of knowledge and confidence. Complementing the primary blue color, secondary colors were selected to enhance the visual hierarchy and differentiate various elements within the app. A light gray shade was chosen as the background color to ensure optimal legibility and create a clean and modern aesthetic. This neutral background allows the primary and accent colors to stand out, directing the users' attention to important information and interactive elements. Accent colors were chosen to add vibrancy and visual interest to the app. The color #fa897b (salmon) and #f4a82e (lightning yellow) were incorporated to create a warm and energetic feel, adding a touch of excitement and enthusiasm. In addition to the primary and secondary colors, #ccabd8 (perfume/lilac) was chosen as an additional secondary color to introduce a soft touch. This shade adds a subtle sense of elegance and sophistication to the app's design while maintaining visual harmony with the other colors. To provide clear feedback to users, a green color was employed to indicate correct answers, while a red color was used to highlight incorrect answers. These choices ensure that users receive immediate and visually distinct cues regarding the accuracy of their responses, enhancing the interactive and engaging nature of the quizzes.

These colors are included in the app's design to produce a unified and eye-catching experience that is consistent with the project's objectives and branding.

5.2 Implementation Phase

The technical components of creating the app utilizing React Native were carried out during the "Implementation phase" of the app development process. In this phase, functional components, screens, and capabilities that supported the quiz-style game, question categorization, scoring system, and leaderboard were translated from the design concepts and requirements.

Using React Native as the development framework provided the advantage of developing a cross-platform app, ensuring compatibility with both iOS and Android devices. The implementation phase can be further divided into several key areas:

- **Component Development** — The app was built using a modular approach, with different components responsible for specific functionalities. These components included the HomeScreen, QuizScreen, ProfileScreen, and GlossaryScreen, among others. Each component was developed to handle specific tasks and provide the desired user interactions.

- **Data Management** — To support the quiz-style game, a data management system was implemented to store and retrieve the points of the user and also to store user information. This involved creating data structures to organize and categorize the points that were gained after each quiz into predefined categories associated with each existing user. Cloud Firestore was utilized for data storage and retrieval, ensuring a seamless and efficient data management process.

- **User Authentication** — The implementation phase also involved integrating user authentication functionality into the app. This allowed users to create accounts, log in, and securely access their profiles and progress. Firebase Authentication was utilized for user authentication, providing a secure and reliable authentication mechanism.

- **Quiz Logic and Scoring System** — The quiz functionality was implemented with careful consideration of the user experience and learning objectives. The logic behind presenting questions, validating answers, and calculating scores was developed to ensure a seamless and engaging quiz experience. XP points were awarded for correct answers, contributing to the gamification aspect of the app and providing a sense of progression for users.

- **Leaderboard Integration** — To enhance user engagement and competition, a leaderboard functionality was implemented. This allowed users to see their ranking. The leaderboard was dynamically updated based on user scores, providing a sense of achievement and encouraging users to improve their performance.

An emphasis on code organization, optimization, and adherence to best practices for React Native development was maintained throughout the implementation phase. Debugging and testing were done frequently to find and fix any bugs or inconsistencies in the app's functionality.

In conclusion, the implementation phase involved the translation of design concepts into functional components, screens, and functionalities. React Native served as the framework for developing a cross-platform app, while Firebase was integrated to support data management and user authentication. The quiz logic, scoring system, and leaderboard functionality were implemented to provide an engaging and interactive experience for the app users. The implementation phase focused on delivering a robust and user-friendly app that met the established project requirements and objectives.

5.3 Integration of Firebase

In the implementation phase, a crucial aspect of the development process was the integration of Firebase into the app's backend. Firebase provided a comprehensive suite of services that facilitated data storage and user authentication.

To integrate Firebase into the app, several key steps were taken. First, a Firebase project was created, and the necessary services were configured based on the app's requirements. This included the setup of the Firebase Authentication and Cloud Firestore.

The app's principal method of data storing was the Cloud Firestore. The scalability, adaptability, and real-time synchronization of this NoSQL database allowed for effective data management and retrieval. The database's structure was created to support user profiles, leaderboard statistics, correct and incorrect quiz questions, and other pertinent information.

In addition, Firebase Authentication was used to implement user authentication. This made it possible for users to download the app, establish accounts, and securely log in. To safeguard

user credentials, Firebase Authentication offered strong security mechanisms including password hashing and encryption.

The integration with Firebase also involved establishing the necessary connections between the app and the Firebase backend. This included configuring the Firebase SDK in the app's codebase, setting up listeners for real-time updates, and handling data synchronization between the app and the server.

5.4 Authentication

User authentication was handled using Firebase Authentication. Firebase Authentication offers backend services, simple SDKs, and ready-made UI frameworks. It supports federated identity providers like Google, Facebook, and Twitter, as well as passwords, phone numbers, and other methods. Firebase Authentication provides a secure and easy-to-use authentication system for applications, allowing users to sign up, sign in, and manage their accounts. One of the authentication methods offered by Firebase Authentication is the email/password method, which allows users to authenticate using their email address and a password they set during the registration process.

When using the email/password authentication method in Firebase Authentication, the following steps typically occur:

1. **User Registration:** Users can create an account by providing their email address and a password. This information is sent to Firebase, which securely stores the user's credentials.

2. **User Sign-in:** To authenticate, users enter their registered email and password. Firebase verifies the provided credentials against the stored information. If the credentials are valid, the user is granted access to the application.

Behind the scenes, Firebase Authentication handles the entire authentication flow, including user registration, secure password storage, and password hashing for security.

In the authentication process, in the sign-up screen, users are required to provide a username, email, and password with a minimum length of six characters, as per Firebase Authentication guidelines. Once a user successfully signs up or logs in, Firebase Authentication generates a unique User ID (UID) for that user. The UID serves as a permanent and unchangeable identifier associated with the user's authentication credentials. It plays a vital role in various aspects of the app's functionality and data management. The UID is securely stored and used to associate user-specific data in Cloud Firestore. This allows for personalized data organization and retrieval based on individual users. It also enables the implementation of personalized features within the app, providing users with a tailored experience. The UID must be handled carefully, and the client-side of the application should not be directly exposed to it. The app makes sure that user data linked to the UID is protected by following best security practices.

The app offers a strong and secure authentication mechanism by integrating Firebase Authentication and employing the UID produced for each user, enabling tailored data management and improving the overall user experience.

5.5 Data Storage

As referred previously, Cloud Firestore, a NoSQL database provided by Firebase, was utilized in the app to store and manage the necessary data. In Cloud Firestore, data is organized into collections, which can contain multiple documents. Each document consists of a set of key-value pairs, similar to JSON objects.

Within Firestore, the app makes use of three key collections to store and retrieve essential information. These collections serve distinct purposes and enable efficient categorization of questions, leaderboard management, and personalized user data storage.

Exploring these collections in more detail:

- **Users** — The Users collection contains documents uniquely identified by the UID of each user. Within each document, fields such as email, name, and points store user-specific information. This enables the app to store and retrieve user details, including contact information, as well as the total points earned by each user.

- **Categories** — This collection consists of documents uniquely identified by the UID of each user. Within each document, six vectors represent different categories of quizzes related to family dynamics in nursing. Each vector comprises 20 zeros, representing individual questions. As users answer questions correctly, the corresponding zeros are updated to 1, reflecting their progress and achievements within each category.

- **Leaderboard** — The Leaderboard collection houses a single document called "ranks." This document acts as a central repository for storing user points. By associating each user's UID with their respective points, the app can easily retrieve and update leaderboard data. This functionality allows users to track their rankings based on their accumulated points.

5.6 Question Categorization

In order to ensure comprehensive coverage of relevant topics in family nursing, the questions in the app were categorized into six distinct categories. The categorization process was based on a previous study [3] and [8] and aimed to provide users with a well-rounded quiz experience. The categories and their corresponding descriptions are as follows:

- **Conceitos (Concepts)** — This category focuses on fundamental concepts and theories related to family dynamics in nursing.

- **Estrutura da Família (Family Structure)** — Questions in this category explore the different aspects of family structures, including types, roles, and dynamics.

- **Processo Familiar (Family Process)** — This category delves into the processes and interactions within family systems, such as communication, decision-making, and problem-solving.

- **Avaliação da Família (Family Assessment)** — Questions in this category assess the knowledge and understanding of family assessment tools and techniques used in nursing practice.
- **Enfermagem à Família (Family Nursing)** — This category covers various aspects of nursing care specifically tailored to families, including health promotion, disease prevention, and therapeutic interventions.
- **Intervenção na Família (Family Intervention)** — Questions in this category focus on the interventions and strategies employed by nurses to support and enhance family health and well-being.

Additionally, a separate category called "Casos Clínicos" (Clinical Cases) was included to provide users with the opportunity to apply their knowledge and critical thinking skills in practical scenarios. This category consists of 17 questions, each presenting a clinical case with multiple-choice options for users to select the most appropriate nursing intervention.

The questions and categories were already established in the previous studies as said, and they were adapted and integrated into the app to offer a comprehensive and engaging quiz experience for users. The questions are presented in Appendix A and divided into their own categories.

5.7 Scoring and Leaderboard

The game includes a scoring system and leaderboard functionality to enhance user engagement and provide a sense of accomplishment. The scoring system is designed to award users with 1 XP (Experience Point) for each correct answer they provide in the quizzes, regardless of the category. This simple and consistent scoring mechanism allows users to track their progress and see their knowledge grow over time. In addition to earning XP points for correct answers, the app also incorporates a dynamic feature that deducts XP points if the user performs worse upon retrying a quiz. If a user decides to retake a quiz they have previously completed and fails more questions than their previous attempt, they will lose a portion of their XP points. This feature adds an additional level of challenge and encourages users to strive for continuous improvement and knowledge retention.

The leaderboard functionality in the app allows users to view their own position in the leaderboard, showcasing their ranking among other participants. The leaderboard serves as a personal benchmark for users to compare their scores and track their improvement. It promotes a sense of competition and self-motivation, as users strive to achieve higher scores and climb up the leaderboard.

However, the 'Casos Clínicos' quiz category, which is specifically designed for training purposes, does not award XP points but it provides users with valuable practice and exposure to clinical scenarios.

By incorporating the scoring system and leaderboard, the app fosters a sense of achievement and progress for users. It encourages them to continue participating in quizzes, learning, and improving their knowledge in the field of family nursing.

5.8 Data Workflow and Communication

The quiz app's interaction between the frontend and backend adheres to a clearly defined procedure that makes data management and communication seamless. What comes next is a description of the normal user contact process, including how requests, data manipulation, and outcomes are affected.

1. **User Interaction:** The user interacts with the frontend of the app, navigating through different screens, answering quiz questions, and viewing their progress. These interactions trigger events and actions within the app, such as submitting answers or viewing their personal rank.

2. **Request Generation:** Based on the user's interaction, the frontend generates requests to the backend, communicating the user's actions and the corresponding data. For example, when a user submits an answer to a quiz question, a request is generated to update their progress and score.

3. **Data Manipulation:** Upon receiving the request from the frontend, the backend processes the data and performs the necessary operations. This involves manipulating the data stored in Firebase's Cloud Firestore based on the user's action. For instance, if the user's answer is correct, the backend updates the corresponding question's status to reflect their achievement.

4. **Result Communication:** After the data manipulation is complete, the backend communicates the result back to the frontend. This can include updated user progress, leaderboard rankings, or other relevant information. The frontend receives and processes the response, ensuring that the user interface reflects the latest data.

By following this workflow, the app seamlessly bridges the gap between the frontend and backend, enabling real-time data manipulation and providing users with accurate and up-to-date information. This efficient and synchronized interaction enhances the user experience, making the app responsive and engaging.

5.9 Testing and debugging

Throughout the testing and debugging phase, a comprehensive approach was taken to ensure the quality and stability of the app. The focus was primarily on manual testing techniques to assess the app's features, functionalities, and user interactions.

Manual testing entailed running preset test cases to confirm how the app would behave in various scenarios and with various user inputs. To make sure the desired behavior was displayed, each screen, button, and user interaction underwent a rigorous test. Any problems or faults discovered during testing were dealt with appropriately.

Functional testing was crucial in confirming that the app's features and functionalities all functioned as intended. The screens, navigation, quiz games, question categorization, scoring system,

and leaderboard had to all be tested. The goal was to make sure that the app's features worked as intended and gave users a smooth experience.

To get input from potential end users, such as nurses or healthcare professionals, usability testing was carried out. This evaluation of the app's usability, intuitiveness, and general user experience was done using survey data that users provided. This feedback provided insightful information that helped pinpoint problem areas and improve the usability of the app.

While automated testing and performance testing was not conducted, the manual testing and debugging processes were carried out diligently to ensure the app's quality and stability. By addressing issues and refining the app based on user feedback, the development process followed an iterative approach to deliver a robust and user-friendly app.

Chapter 6

Results

This chapter presents the results of the evaluation conducted to assess the functionality, user engagement, and limitations of the 'Nurture' app. The chapter is divided into three main sections to provide a comprehensive understanding of the app's performance and user feedback.

1. **Application Showcase:** This section showcases the fully developed and refined version of the 'Nurture' app. It provides an in-depth look at the app's interface, features, and functionality through a series of screenshots. These visuals offer a comprehensive representation of the app's user interface design and demonstrate how it has evolved to its final state.

2. **User Engagement and Feedback:** In this section, the user engagement and feedback received during the testing phase are evaluated. The feedback was collected using a Google Form survey that targeted users' experiences and perceptions of the app. The survey questions focused on evaluating the app's effectiveness in facilitating learning outcomes and assessing user satisfaction with the user interface. The collected data is analyzed and discussed, providing insights into users' perspectives and their overall engagement with the app.

3. **Limitations and Challenges:** The final section of this chapter addresses the limitations and challenges encountered during the development and evaluation of the 'Nurture' app. These limitations include technical constraints, time limitations, and delay in the user's feedback.

The findings presented in this chapter serve as a foundation for drawing conclusions, discussing implications, and formulating recommendations in the subsequent chapters. The results contribute to the overall assessment of the 'Nurture' app, providing insights into its functionality, user engagement, and potential areas for improvement.

6.1 Application Showcase

This chapter, it is provided an in-depth overview of the finalized application developed as part of this dissertation. This chapter serves as a platform to present the key features, functionalities, and design aspects of the application, offering a comprehensive understanding of its capabilities.

6.1.1 Name and Logo of the App

The name "Nurture" was carefully chosen to reflect the essence and purpose of the app. It captures the core concept of fostering growth, development, and care, which are all fundamental aspects of the nursing profession and the app's content.

"Nurture" is concise, memorable, and evokes a positive emotional response and also conveys a sense of nurturing and support, aligning perfectly with the app's focus on family dynamics in nursing. It encapsulates the importance of nurturing relationships, understanding the dynamics within families, and providing compassionate care.

After naming the app, it was important to explore its visual representation through the logo. The logo of the "Nurture" app embodies the essence of knowledge and care in the context of family dynamics in nursing. It features two hands, one positioned above the other, cradling a heart symbol. This imagery represents the nurturing nature of healthcare professionals and their dedication to providing compassionate care to families. The heart symbolizes the deep connections formed with patients and their loved ones. The hands, symbolizing expertise and support, gently hold the heart, reflecting the app's mission to enhance nurses' knowledge and understanding of family dynamics.



Figure 6.1: Logo

The logo's design is complemented by the app's chosen color palette, with the hands and heart rendered in a coral color that conveys warmth, empathy, and a sense of vitality. Below the logo, the name 'Nurture' is elegantly displayed in white, representing the pursuit of knowledge and the importance of fostering strong relationships within the nursing profession.

Together, the logo symbolizes the app's commitment to empowering nurses with the knowledge and skills needed to navigate complex family dynamics effectively. By engaging in interactive quizzes, nurses can deepen their understanding of family dynamics and apply this knowledge to their caregiving practices, ultimately enhancing the quality of care provided to patients and their families.

The same logo design is used as the app's icon, representing the app's mission to empower nurses with the knowledge and skills needed to navigate complex family dynamics effectively.

By incorporating the logo as the app icon, it ensures instant recognition and reinforces the app's purpose and branding.

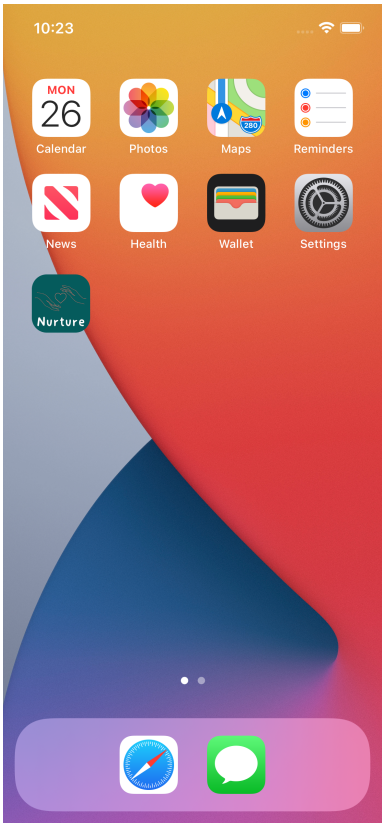


Figure 6.2: App Icon

6.1.2 Sign-In and Sign-Up

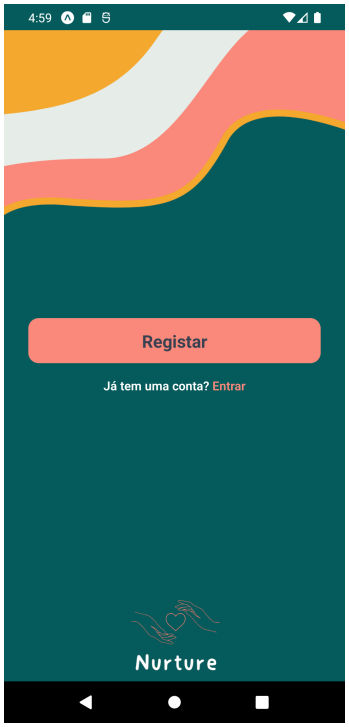
After the app is launched, users are greeted with a visually appealing splash screen that briefly appears while the app loads its resources, creating a smooth and engaging user experience.

Following the splash screen, the app presents users with two distinct paths, depending on their login status. If the user is not already logged in, they are directed to a welcome screen 6.3b where they are presented with two options: "Registrar" (Register) and "Entrar" (Login). These options enable new users to create an account 6.3c or existing users to log in 6.3d to their account.

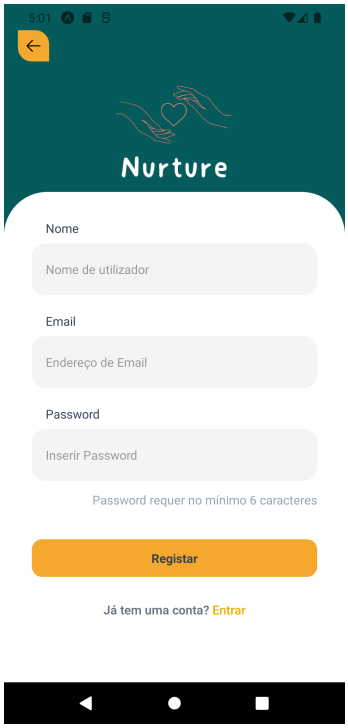
On the other hand, if the user is already logged in, the app automatically bypasses the welcome screen and takes them directly to the Home Screen. This almost seamless transition allows returning users to quickly access the app's main features and content without any additional steps.



(a) Splash Screen



(b) Welcome Screen



(c) Registration Screen



(d) Login Screen

Figure 6.3: Authentication Screens

The user onboarding process and account management within the app heavily rely on the Login and Registration screens. Users have the choice to either establish a new account or log in to an existing account on these screens.

The Registration screen allows new users to create their account by providing necessary information, such as their name, email address, and a secure password. As indicated in the previous chapters, Firebase Authentication is used for authentication, hence the password must be at least 6 characters. If the user already has a registered account, they can visit the login screen from this screen. Once users have filled in the required information, they can submit the registration form and proceed to access the app's features and content.

On the other hand, the Login screen allows existing users to securely access their account. Users typically enter their registered email address and password to log in. Additionally, there is also the option to go to the Registration Screen if the user does not have an account registered.

To maintain a unified and aesthetically pleasing design throughout the app, the design of these screens adheres to the general user interface and incorporates the chosen color scheme, font, and visual components.

Users must log in and register before they can access the app's features, take quizzes, and keep track of their progress. They are essential in promoting user interaction and guaranteeing a safe and customized experience within the app.

6.1.3 Home Screen

The Home Screen is a central hub within the app that serves as the main dashboard for users once they have logged in to the app. It is designed to provide a clear and intuitive overview of the app's features and navigation options.

Upon reaching this screen, users are greeted with a visually appealing and organized layout.

The Home Screen consists of several key components. It begins by extending a personalized welcome to the user. Upon logging in, the app retrieves the username associated with the user's account and displays a warm greeting. This simple yet meaningful gesture creates a sense of connection and acknowledges the user's presence within the app.

By incorporating the username into the greeting, the app establishes a personal touch, making the user feel recognized and valued. This element of personalization enhances the overall user experience and fosters a sense of belonging within the app's community.

The User's Current Points or XP (Experience Points) acquired from correctly answering quiz questions are also displayed on the Home Screen alongside with their rank position. This serves as a motivation for users to engage with the app, track their progress, and strive for higher scores.

The Home Screen features a touchable element designed to resemble a button, inviting users to participate in the 'Casos Clínicos' quiz, a valuable practice resource for enhancing their understanding of family dynamics in nursing. Positioned below the user's information(XP points and rank), this touchable element serves as a prominent call-to-action, capturing the user's attention and encouraging them to take part in an engaging and educational activity.

Above the touchable element, a motivational message in bold letters, "Vamos Praticar!", is displayed. This phrase creates a sense of enthusiasm and encourages users to actively engage in the learning process. The message serves as a gentle reminder of the importance of practice and reinforces the app's commitment to supporting users' growth and development in the field of family nursing. The combination of the touchable element resembling a button and the motivating message creates an enticing opportunity for users to dive into the 'Casos Clínicos' quiz, providing them with a practical way to apply their knowledge and further solidify their understanding of family dynamics in healthcare.

One prominent feature is the category selection section, where users can choose from the distinct categories related to family dynamics in nursing. These categories are thoughtfully curated to ensure comprehensive coverage of relevant topics in family nursing. By selecting a category, users can dive into quizzes and enhance their knowledge in specific areas of interest. These categories are inserted in a Flatlist, which is a React Native component that renders items in a scrollable view, that permits one to scroll horizontally.

To enhance user navigation, a bottom navigation tab is present throughout the Home Screen and other sections of the app. This tab includes icons and labels representing the core sections, such as Home, Profile, and Glossary. Users can easily switch between these sections by tapping on the respective icons, providing a seamless and intuitive browsing experience.



Figure 6.4: Home Screen

6.1.4 Profile Screen

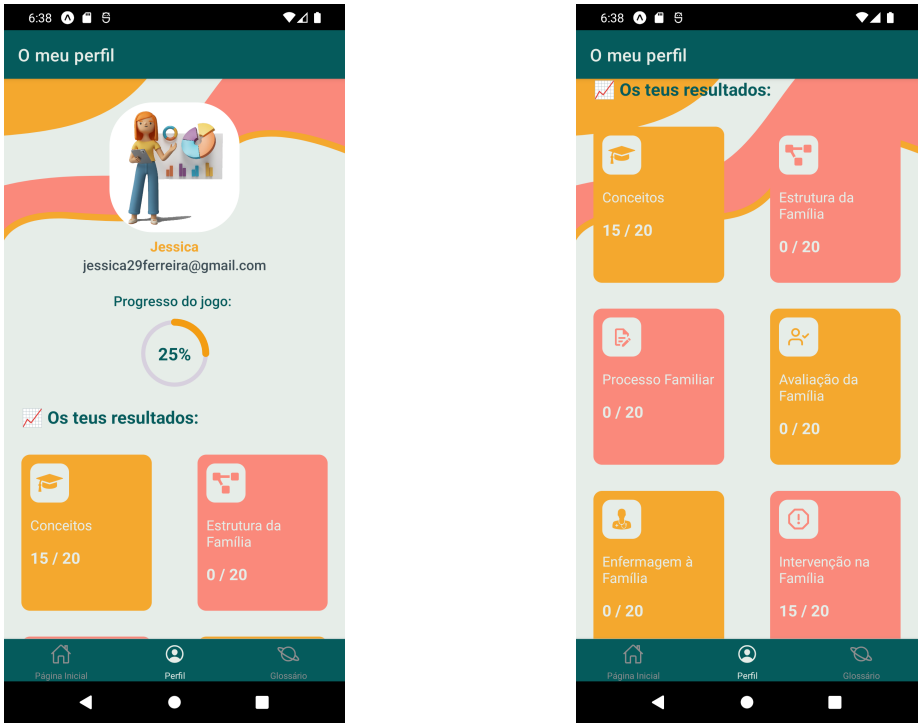
The Profile Screen serves as a personalized space for users to view and track their progress within the app. It provides valuable insights and statistics related to their performance, achievements, and overall engagement.

The screen presents a 3D image that showcases statistics and graphics, creating a captivating environment that conveys a sense of progress and growth.

Upon entering the Profile Screen, users are greeted with their username and email, providing a personalized touch and reinforcing their identity within the app. Below the user information, a circular graph serves as a visual representation of their in-game progress. As users answer questions correctly, the graph gradually fills up, reaching 100% when they have successfully answered all questions in the app. This visually engaging element motivates users to strive for complete mastery of the content.

Scrolling further down the screen, users encounter a vertically-oriented flatlist that showcases the different quiz categories. Each category is represented by a square with an icon, accompanied by the name of the category and the number of correct answers out of the total number of questions in that category. This intuitive and concise representation allows users to quickly assess their performance in each category, identifying their strengths and areas for improvement.

Users can easily keep track of their progress, learn more about their performance, and remain interested in their learning process thanks to this intelligently designed Profile Screen.



(a) User information and in-game progress

(b) User results in each category

Figure 6.5: Profile Screen

6.1.5 Glossary Screen

The Glossary Screen serves as a valuable resource for users to enhance their understanding of key terms and concepts in nursing. It provides a user-friendly interface that facilitates easy access to a comprehensive collection of words and their definitions.

Upon entering the Glossary Screen, users are presented with a clean and organized layout. The screen features a search bar at the top, allowing users to quickly find specific terms of interest. This search functionality enhances usability and enables users to locate information efficiently.

Below the search bar, the Glossary Screen displays a scrollable list of words in alphabetical order. Each word is accompanied by its corresponding definition, presented in a clear and concise manner. This layout ensures that users can easily browse through the glossary and access the information they need without unnecessary distractions.

In the development of the app's glossary feature, it is worth mentioning that due to the specific nature of the content related to family dynamics in nursing, there was no readily available API specifically catering to this type of information. As a result, an alternative approach was adopted to ensure the inclusion of a comprehensive glossary within the app.

Extensive research and exploration were undertaken to identify a suitable online resource that provided the necessary words and definitions relevant to the field. Despite the absence of a dedicated API, a reliable website specializing in health and related topics was discovered. This website [17] served as the primary source for gathering the words and their corresponding definitions.

By leveraging the content available on the website, the app was able to provide users with a rich and informative glossary. The selected words and definitions were reviewed, ensuring their accuracy, relevance, and alignment with the educational objectives of the app. Although the process involved manual extraction and integration of the content, it allowed for the creation of a valuable resource for users.



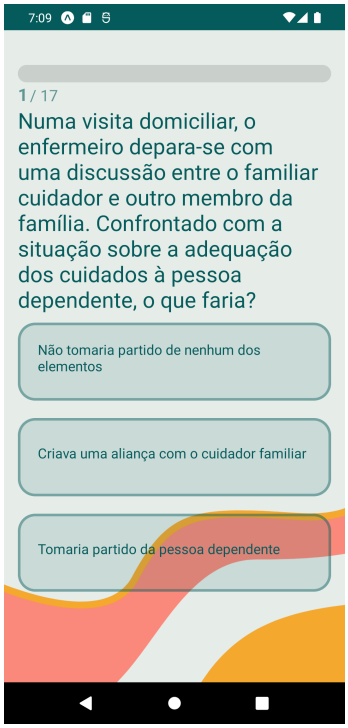
Figure 6.6: Glossary Screen

6.1.6 Quiz Screen

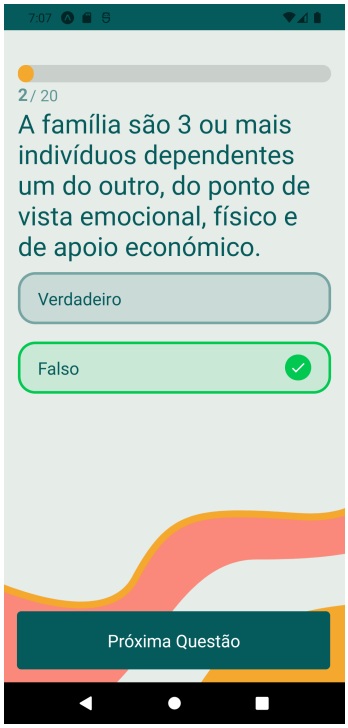
The Quiz Screen is the fundamental component of the app that enables users to test their knowledge and understanding of family dynamics in nursing. It provides an interactive and engaging quiz experience with carefully crafted questions and answers options. Upon entering the Quiz Screen, users are presented with a question and a set of possible answers 6.7a. The layout is designed to ensure clarity and ease of use, allowing users to focus on the content without any distractions. The question itself is prominently displayed, followed by the available answer options, which may vary depending on the type of question (e.g., true or false, multiple-choice).

To enhance the user experience, visual cues are employed to indicate the progress of the quiz. Users can easily track their progress through a progress bar, which visually represents the number of questions completed and the total number of questions in the quiz but it is also written the number of the present question and the total of questions. This provides users with a clear sense of their advancement throughout the quiz. Additionally, to provide immediate feedback, the app visually distinguishes between correct and incorrect answers. This allows users to instantly identify whether their response was accurate or not. In the case of an incorrect answer, the answer is highlighted in red along with a wrong icon and also shows the correct option in green accompanied by a "correct" icon, enabling users to learn from their mistakes and reinforce their understanding of the topic. This can be seen in the figures 6.7b and 6.7c.

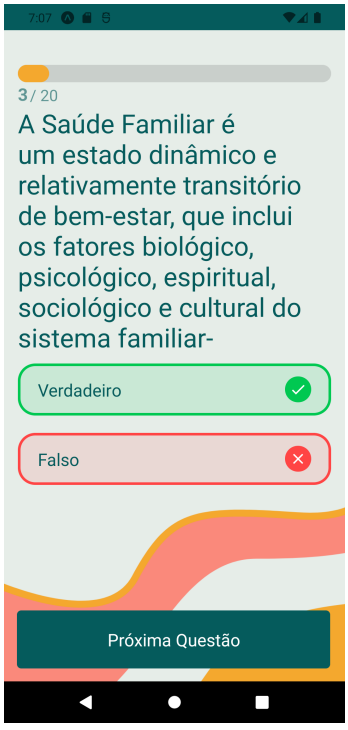
When the quiz is finished, a modal window appears, displaying the user's score and providing options for further actions. Users can repeat the quiz, or return to the Home Screen.



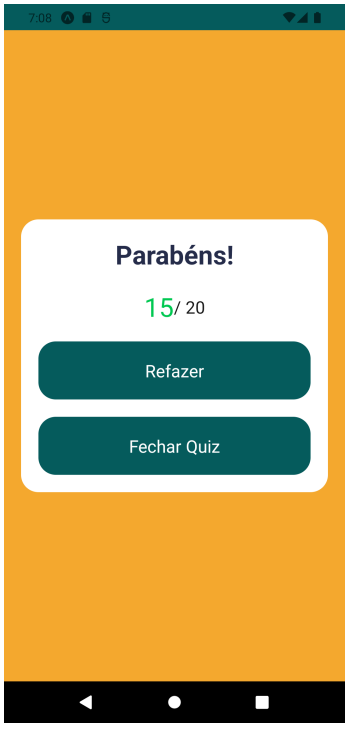
(a) Overall Quiz Screen



(b) User got the correct answer



(c) User gave an incorrect answer



(d) User completed the quiz

Figure 6.7: Overview of the Quiz Screen

6.2 User Engagement and Feedback

This section of this study focuses on gathering valuable insights and feedback from the users of the mobile app developed for teaching nurses about family issues and dynamics. In order to assess the app's effectiveness and gather user perspectives, a user feedback survey was conducted using Google Forms. This section presents an overview of the methodology employed, the response rate achieved, and a detailed analysis of the feedback received. The feedback collected from the users plays a crucial role in evaluating the app's impact on learning outcomes, user interface (UI), and user experience (UX). The target audience's thoughts and ideas are requested in order to acquire important insights that may be used to improve the functionality and usability of the app. The feedback analysis also aids in identifying areas for improvement and strengths, ultimately assisting in the continued creation of a useful and user- centered instructional tool for nurses.

6.2.1 Methodology

The primary objective was to assess the effectiveness of the app in achieving its learning outcomes and to obtain user perspectives on its user interface (UI) and overall user experience (UX). To achieve this, a structured approach was followed, consisting of the following key steps:

- **Designing the User Feedback Survey** – A user feedback survey was developed using Google Forms. An Informed Consent Term was inserted in the first part of the questionnaire. This consisted of a page explaining the research and requesting authorization to use the data. The sociodemographic and professional information of the participants was then sought. This information included gender, age, educational background, nursing specialization, area of practice, and experience working with families. After that, the survey comprised a series of questions that covered various aspects of the app, including content relevance, usability, and overall satisfaction. Additionally, open-ended questions were included to allow users to provide detailed feedback and suggestions for improvement.

- **Survey Distribution** – To ensure a diverse sample of respondents, the survey was distributed to a target audience consisting of nursing students and practicing nurses. The aim was to reach a broad spectrum of users with different levels of nursing experience and educational backgrounds.

- **Data Collection** – The data collection process involved encouraging users to complete the survey voluntarily and anonymously. Participants were provided with clear instructions on how to access and submit their responses. The survey remained open for a specified period to allow sufficient time for users to provide their feedback.

- **Data Analysis** – Once the survey period ended, the collected data was compiled and analyzed using both quantitative and qualitative methods. The quantitative analysis involved

summarizing and interpreting the survey responses. The qualitative analysis focused on extracting key themes and insights from the open-ended responses, capturing the nuances of user experiences and suggestions.

- **Findings and Recommendations** – The recommendations derived from the user feedback analysis will inform future updates and iterations of the app, ensuring its continued effectiveness and user satisfaction.

6.2.2 Response Rate and Users Background

In order to gather valuable insights and feedback from users, a user feedback survey was conducted using a Google Forms questionnaire present in Appendix B. Although the response rate for the survey was relatively low, with only 7 participants, their feedback provides important perspectives on the app's functionality, usability, and overall user experience.

While the response rate was lower than anticipated, it is important to acknowledge the challenges of obtaining a high response rate in any survey. Factors such as time constraints, user availability, and competing priorities may have influenced the response rate in this case.

Despite the limited number of responses, the feedback provided by these 7 participants is still valuable and provides insights into their experiences and perceptions of the mobile app. It is worth noting that even a small number of responses can offer useful feedback and highlight areas for improvement.

Understanding the characteristics and backgrounds of the participants who provided feedback on the app is essential to gain insights into the target audience and the relevance of the findings. The following image 6.8 presents an analysis of the demographics of the survey respondents, including gender, nationality, age range, experience in family nursing, years of professional experience, academic degrees, specializations, and areas of expertise in family nursing. This information provides valuable context for interpreting the feedback and evaluating the app's effectiveness within specific segments of the nursing community.

ID	Gender	Country Activity	Age	Academic Degree	Specialization	Years of Profissional Experience	Profissional Activity	Experience in Family Nursing	Area of Expertise in Family Nursing
1	Feminine	Portugal	54	Doctorate	Medical-Surgical Nursing	30	Teaching	No	Teaching
2	Feminine	Portugal	46	Doctorate	Community Nursing	25	Teaching	Yes	Clinical Practice, Teaching, Research
3	Feminine	Portugal	42	Degree in Nursing	Maternal and Obstetric Health Nursing	16	Nurse in Clinical Practice	Yes	Clinical practice
4	Feminine	Portugal	43	Degree in Nursing	Community Nursing	21	Nurse in Clinical Practice	Yes	Clinical practice
5	Feminine	Portugal	51	Degree in Nursing	Rehabilitation Nursing	37	Nurse in Clinical Practice	Yes	Clinical practice
6	Feminine	Portugal	22	Degree in Nursing	None	0	Other	Yes	Clinical practice
7	Feminine	Portugal	55	Degree in Nursing	Rehabilitation Nursing	34	Nurse in Clinical Practice	No	Clinical practice

Figure 6.8: Demographic Data of Survey Respondents

6.2.3 Feedback Analysis

The feedback analysis focused on evaluating various aspects of the app, including its content, usefulness, usability, and motivation/engagement. Participants were asked to rate their agreement or disagreement on a Likert scale[18] ranging from 1 to 5, with 1 representing 'strongly disagree' and 5 representing 'strongly agree.' The following graphics presents a summary of the feedback analysis, highlighting the participants' ratings and their overall satisfaction with the app's content, usefulness, usability, and motivation/engagement. The results offer valuable insights that can guide future improvements and enhancements to ensure an optimal learning experience for users.

Evaluation of the app content and usefulness

Regarding the questions about the app's content, usefulness, and impact on the professional practice of the users, the feedback was overwhelmingly positive with the average rating exceeding 4. This demonstrates a high level of agreement and satisfaction among the participants. At least 60% of questions are above 4,5 of average. These results indicate that the app's content was well-received and considered valuable for enhancing participants' understanding of family-related topics and supporting their professional development.

Usability

The usability evaluation aimed to assess the user experience and interface effectiveness of the app. Participants were asked to provide feedback on various aspects of usability, including navigation, clarity of instructions, ease of use, and overall user satisfaction. These questions can be consulted in Appendix B.5.

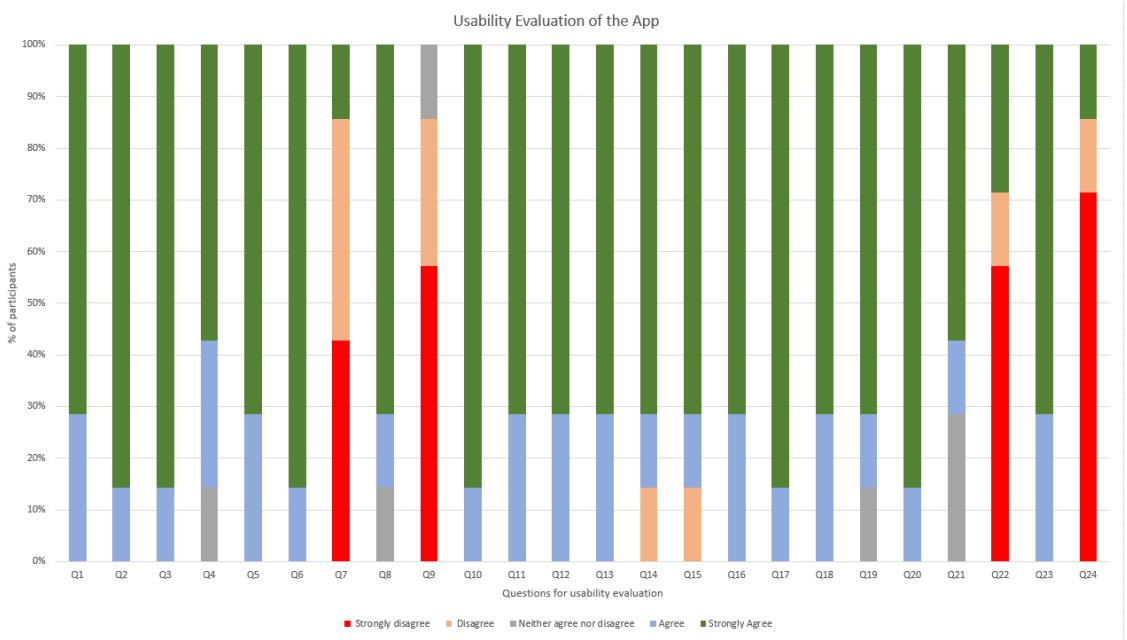


Figure 6.9: Usability Evaluation Results

In relation to the usability results, it is worth noting that a small number of participants encountered difficulties with the app, particularly in tasks related to selecting answers and navigating between questions. However, it is important to highlight that the majority of participants did not experience significant issues and were able to use the app without any major obstacles.

The identified problems could be attributed to minor interface inconsistencies, which can be addressed through further refinements in the app's design and user interface. These findings emphasize the importance of continuously improving the user experience and addressing any usability issues to ensure a seamless and intuitive interaction for all users.

It is worth mentioning that despite the mentioned challenges, overall user feedback regarding the app's usability was positive. The majority of participants found the app easy to use, intuitive, and conducive to their learning experience. This indicates that the app has generally met its objectives of providing a user-friendly interface and facilitating effective navigation through the content.

Motivation and Engagement

Regarding the motivation and engagement results, participants' feedback indicated a positive response to the app's features and their overall engagement with the content. The majority of participants expressed that the app contributed to their motivation and interest in the subject matter. The results of this part of the survey are presented in the graphic of the image 6.10.

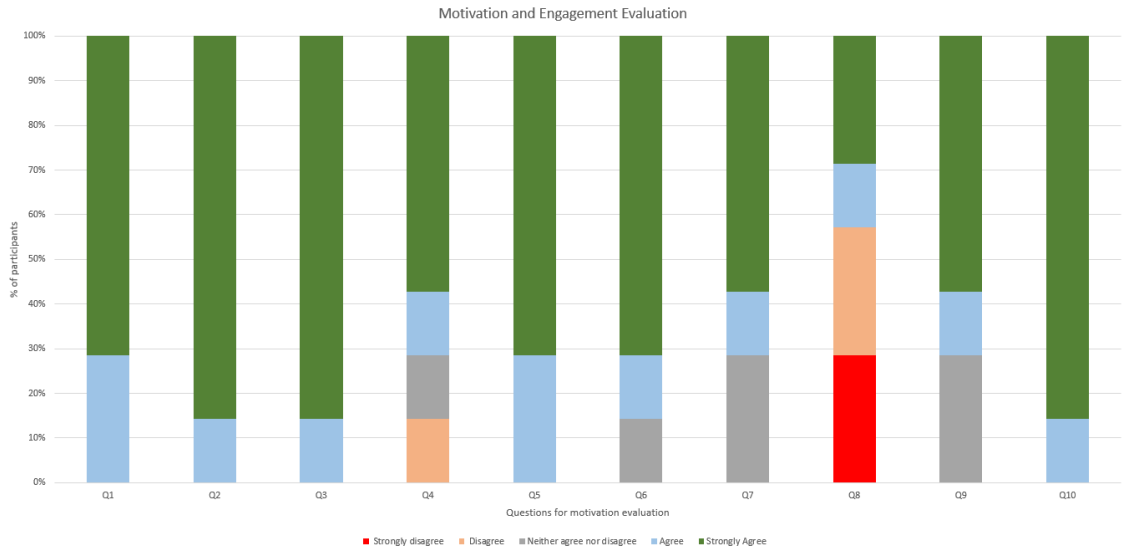


Figure 6.10: Motivation Evaluation Results

The participants expressed a high level of motivation and found the app to be engaging and captivating. From the results, it is possible to conclude that the application sparked their interest in exploring further topics related to family nursing. Furthermore, the users appreciated the feedback provided by the app, including the gamification elements such as points and rank. Based on these positive experiences, the users highly recommend this application to other nursing professionals.

However, it was noted that some participants experienced a sense of monotony or repetition when using the app(Q8 bar in the graphic image) over an extended period of time. This observation suggests that while the app initially captured participants' attention and engagement, it may have lacked variety or novel elements to sustain their interest throughout prolonged usage.

6.2.4 Recommendations for Improvement

This section presents the advantages and disadvantages expressed by the participants regarding their learning experience. Additionally, participants provided suggestions for improving the application's functionality and educational impact. By analyzing the open-ended responses, a deeper understanding of the users' perspectives can be gained, which will inform future enhancements of the application.

Advantages and Disadvantages

Table 6.1: Advantages and Disadvantages regarding learning with Nurture

Advantages	Disadvantages
Easy	Monotony
Interesting	
Interactive	
Beginner Friendly	
Decision-making	

Improvements

The participants' suggestions for app improvement primarily revolved around two key aspects. First, some participants expressed the desire for a more comprehensive feedback system. They recommended that when a player selects an incorrect answer, the app should not only indicate the correct response but also provide a detailed explanation of the correct answer. This suggestion aims to enhance the learning experience by providing informative feedback that promotes better comprehension and retention of knowledge.

Secondly, participants suggested increasing the number of clinical cases available in the app. They expressed a need for a broader range of case studies to enrich the learning experience and provide a more diverse set of scenarios for analysis and problem-solving.

Furthermore, a few participants noted the importance of addressing grammatical errors in some of the questions. They emphasized the need for grammatical accuracy to maintain the app's overall professionalism and credibility.

6.3 Limitations and Challenges

The development of the mobile app posed several limitations and challenges throughout the project. One of the primary challenges encountered was the learning curve associated with the

language to be used for the development. React Native, being based on JavaScript required a significant amount of time and effort to become proficient in its usage. The complexities and intricacies of JavaScript presented a learning challenge that had to be overcome.

The lack of directly relevant previous studies and resources was another noteworthy obstacle that had to be overcome during the development of the mobile app. A relatively new and specialized field of research was the idea of integrating gamification aspects to instruct nurses about family difficulties and dynamics in healthcare. Because there are not much research or established frameworks that are relevant to this situation, a significant portion of the development process included creating the game mechanics from scratch. The lack of specific studies or recommendations targeted to nursing education on family dynamics created an extra hurdle, despite efforts to use basic principles of gamification and educational game design.

Another significant challenge arose during the integration of the backend with the frontend. Coordinating the communication between the server infrastructure and the user interface required meticulous planning and attention to detail. Ensuring the seamless interaction and synchronization between the two components proved to be a complex task.

Furthermore, the project faced limitations due to time constraints. The extensive nature of acquiring proficiency in the language, implementing all the desired features, and producing a fully functional app within the given timeframe proved to be demanding. Despite best efforts, some aspects had to be prioritized, and certain features or enhancements had to be deferred to future iterations.

Additionally, the time required to gather results and feedback from users impacted the progress of the project. Conducting comprehensive user testing and collecting meaningful feedback is a time-consuming process that requires active participation and engagement from the target audience.

In conclusion, even though the mobile app development met the milestones, it is crucial to recognize and resolve the problems encountered. The project's advancement was impacted by overcoming the learning curve, coordinating the backend and frontend, managing schedule restrictions, and gathering user feedback. These difficulties identify potential areas for development in upcoming iterations of the program and serve as useful lessons for future initiatives.

Chapter 7

Conclusions and Future Work

This chapter presents the conclusions drawn from the development and evaluation of the mobile app aimed at teaching nurses about family dynamics in healthcare. It begins by discussing the satisfaction of objectives, highlighting the extent to which the app successfully achieved its intended goals. Subsequently, the chapter delves into the future work that can be undertaken to enhance and expand upon the app's functionality and impact.

7.1 Satisfaction of objectives

The primary objectives of this study were to develop a mobile app with gamification elements to enhance the learning experience of nurses regarding family issues and dynamics, and to evaluate its effectiveness and usability. Throughout the course of this research, these objectives were successfully achieved. By leveraging gamification elements, such as quizzes, interactive activities, and feedback mechanisms, the app aimed to enhance user engagement and facilitate knowledge retention.

The evaluation phase of the study involved collecting feedback from participants, who consisted of students and practicing nurses. The feedback analysis revealed that the app was well-received, with participants expressing satisfaction with its content, usability, and interactive features. They found the app to be a valuable tool for improving their understanding of family nursing concepts and enhancing their professional practice.

The findings of this study not only demonstrate the effectiveness and usability of the developed mobile app but also shed light on an important gap in the existing literature on nursing education, specifically in the area of family nursing. Prior to this research, there was a lack of interactive and gamified mobile applications specifically designed to enhance nurses' understanding of family issues and dynamics.

By bridging the gap in the existing literature, this thesis sets the stage for future studies, collaborations, and advancements in the area of gamified mobile applications for nursing education. It reinforces the importance of integrating interactive and engaging learning strategies to meet the evolving educational needs of healthcare professionals.

In conclusion, this study successfully developed and evaluated a mobile app that effectively engaged and educated nurses on family issues and dynamics. The positive outcomes and participant feedback validate the potential of this app as an innovative tool in nursing education, offering a gamified and interactive approach to enhance learning outcomes and professional practice in the field of family nursing.

7.2 Future Work

In light of the achievements and insights gained from the development and evaluation of the mobile app, several avenues for future work and enhancements have been identified. These possibilities aim to further enrich the user experience, introduce additional gamification elements, and foster healthy competition among users. The following suggestions outline potential directions for future development:

- **Persona Creation** — To enhance user engagement and personalization, the creation of a persona with whom users can identify would be valuable. This persona could represent various user profiles, such as nursing students or practicing nurses, and serve as an additional gamification element. By embodying a relatable character, users can feel a stronger connection to the app and its content.

- **Online Quizzes with Competitions** — Introducing online quizzes with one-on- one competition can add a new layer of excitement and engagement to the app. Users would have the opportunity to challenge their peers or colleagues in real-time quizzes, fostering a sense of healthy competition and promoting knowledge exchange within the nursing community.

- **Personalized Quizzes** — Allowing users to create their own quizzes for self- assessment would empower them to test their knowledge and share their quizzes with friends. Implementing a feature that generates unique codes for user-created quizzes, enabling easy sharing, would facilitate a sense of collaboration and friendly competition among users. This could be accompanied by the introduction of a friendlist feature, enhancing social interaction within the app.

- **Enhanced Feedback with Detailed Explanations** — By incorporating this feature, the app can provide users with a comprehensive and educational experience, offering them the opportunity to learn from their mistakes and deepen their knowledge. The detailed explanations can include relevant theoretical foundations, practical examples, or references to authoritative sources, thereby fostering a deeper understanding of the subject matter

By implementing these enhancements, the app would become more comprehensive, challenging, and engaging. The integration of additional gamification elements and the introduction of healthy competition would further motivate users and promote continuous learning. These future

developments have the potential to strengthen the app's impact on nursing education and contribute to a more interactive and collaborative learning environment.

It is crucial to keep in mind that these ideas are just the beginning and may be expanded upon in light of user feedback and new developments in mobile app development. Meeting the changing requirements and preferences of users in the nursing community will require constant improvement and adaptation.

Appendix A

Category Questions

A.1 Concepts

1. Os membros da familia são autodefinidos - **V**
2. A família são 3 ou mais indivíduos dependentes um do outro, do ponto de vista emocional, físico e de apoio económico - **F**
3. A Saúde Familiar é um estado dinâmico e relativamente transitório de bem-estar, que inclui os fatores biológico, psicológico, espiritual, sociológico e cultural do sistema familiar - **V**
4. Enfermagem à família consiste em trabalhar com as famílias ajudando-as a identificar problemas e a mobilizar os seus próprios recursos - **V**
5. A estrutura familiar permite Identificar os indivíduos que constituem o agregado familiar - **F**
6. A função familiar é o objetivo que a família serve em relação ao indivíduo, a outros sistemas sociais e à sociedade - **V**
7. A teoria geral dos sistemas não permite ser aplicada pelos profissionais de saúde à compreensão das famílias - **F**
8. No conceito de hierarquia de sistemas o sistema familiar é parte de um suprassistema mais amplo e, por sua vez, é composto de muitos subsistemas - **V**
9. As seguintes características permitem definir uma família saudável: tempo passado em família, rigidez, capacidade para lidar com o stress, comunicação positiva, afeto e limites fixos - **F**
10. A família disfuncional é incapaz de desenvolver as suas funções e tarefas. (Alteração de papéis, indiferença face à mudança, incapacidade de pedir ajuda, sentimento de falta de esperança - **V**

11. O conceito da teoria dos sistemas, aplicado às famílias, enfatiz a necessidade de "Parcialidade da Família" - **F**

12. A família como um todo é maior do que a soma das partes - **V**

13. Estudar separadamente cada membro da família é igual a estudar a família como uma unidade - **F**

14. A resiliência familiar é o processo que permite à família manter-se unida durante os momentos de stress da vida, tolerar e crescer como uma unidade com espírito de família - **V**

15. Genograma é uma representação visual da unidade familiar, em relação à comunidade, mostra a natureza das relações entre os membros da família e entre eles e o mundo que os rodeia - **F**

16. A melhor definição de família para os enfermeiros é aquela que utiliza critérios consaguíneos - **F**

17. A mudança num membro da família afeta todos na família - **V**

18. Os comportamentos da família são mais bem compreendidos sob um ponto de vista de causalidade linear e não circular - **F**

19. A ampliação do entendimento a respeito de um problema raramente é responsável por mudanças na família, mas ao contrário estas correm mediante modificação de crenças e comportamentos - **V**

20. No ciclo vital da família ocorrem mudanças resultantes da sua evolução ao longo do ciclo de vida que não se constituem como momentos de stress - **F**

A.2 Family Structure

1. Na família de acordeão um dos elementos tem ausências prolongadas fora do lar. O que fica assume normalmente as funções do ausente - **V**

2. A família psicossomática também pode ser denominada de colocação. São famílias que acolhem transitoriamente um elemento - **F**

3. A família hospedeira perdeu um elemento importante e continua a funcionar como se ele existisse e estivesse presente. Viveu um luto incompleto e tem dificuldade em se reorganizar - **F**

4. A família flutuante caracteriza-se por um elevado grau de emaranhamento e pela ênfase no papel educativo e cuidados a desempenhar bem como no resto da família ideal - **F**

5. As famílias unipessoais são constituídas por uma só pessoa, por opção ou não. Podem ser problemáticas porque não têm suporte social - **V**

6. As famílias desmembradas são aquelas e que os subsistemas e os elementos estão afastados. Existem fronteiras flexíveis entre os subsistemas o que permitem a comunicação e o afeto - **F**

7. Família pás de deux - dois elementos caracterizados por uma mútua dependência (ex. casal em situação de ninho vazio) - **V**

8. As famílias com padrasto/madrasta são as denominadas reconstituídas ou recasadas. Em situação de doença são as que necessitam de menos tempo para se reorganizarem. - **F**

9. A família como sistema social não precisa de definir os seus objetivos e os meios para a atingir - **F**

10. Algumas instituições assumiram muitas das funções que outrora tinham sido da responsabilidade da família (socialização dos filhos e de cuidadores) - **V**

11. A função da família ao micronível são analisados as consequências da função na unidade familiar e crescimento dos seus membros - **V**

12. A função da família ao macronível é analisado o efeito da família como instituição social - **V**

13. Atualmente as funções da família na sociedade são apenas a reprodução - **F**

14. A família como sistema social não precisa de definir os seus objetivos e os meios para a atingir - **F**

15. Para sobreviver como sistema social, a família não precisa de satisfazer determinados pré-requisitos funcionais - **F**

16. Os pré-requisitos funcionais da família são adaptação, a realização de objetivos, a integração, a manutenção de padrões e o controlo de tensões - **V**

17. Nas suas interações uns com os outros, os familiares não precisam de desenvolver expectativas acerca do modo como cada um se deve comportar - **F**

18. As famílias idosas, tal como os idosos, têm mais semelhanças do que diferenças - **F**

19. A função familiar é o objetivo que a família serve em relação ao indivíduo, a outros sistemas sociais e à sociedade - **V**

20. As crises normativas ou de desenvolvimento da família são inesperadas e em consequênca das passagens ao longo do ciclo vital - **F**

A.3 Family Process

1. O papel de provedor está ligado ao elemento que detêm poder económico. Relaciona-se também com o papel de defensor da família - **V**
2. A estrutura familiar diz respeito à interação contínua entre os membros da família, através da qual eles realizam as tarefas instrumentais e expressivas - **F**
3. O desempenho competente de papéis é um determinante no processo familiar - **V**
4. O papel recreativo é frequentemente o primeiro a ser deixado para trás quando a família está sob stress - **V**
5. Um sistema familiar saudável cracteriza-se por comunicação aberta - **V**
6. No processo familiar não são importantes as estratégias de coping - **F**
7. O que mais distingue as famílias é a sua estrutura - **F**
8. O processo familiar parece ter maior efeito sobre o estado de saúde da família do que a estrutura e a função - **V**
9. Cada posição dentro da família comporta apenas um papel - **F**
10. O processo de comunicação é normalmente o maior problema das famílias - **V**
11. Mesmo as famílias funcionais podem ter dificuldade em lidar com causas de stress acumuladas - **V**
12. O facto de os subsistemas não terem funções diferentes obriga à definição clara de limites e fronteiras- **F**
13. Os limites dos subsistemas podem ser claros, difusos e rígidos - **V**
14. O subsistema parental é composto pelos irmãos constitui-se como o primeiro espaço de socialização - **F**
15. Uma fonte ou causa de tensão num papel familiar pode ser a falta de conhecimento do papel, conflito do papel, falta de consenso de papel e saturação do papel - **V**
16. O subsistema parental tem como objetivo a educação e proteção dos filhos podendo incluir outros elemtentos além dos pais - **V**
17. Os diferentes componentes do sistema familiar organizam-se em unidades sistémico-relacionais denominadas de agregados - **F**
18. A saúde das famílias são influenciadas por fatores psicológicos, sociais, culturais, espirituais e filosóficos - **V**

19. Os limites rígidos num subsistema familiar delimitam o espaço e as funções de cada membro ou subsistema, permitindo a troca de influências entre os mesmos - **F**

20. Os limites difusos num subsistema familiar são marcados por uma enorme permeabilidade, onde o sistema perde a identidade e integridade - **V**

A.4 Family Nursing

1. De acordo com Hanson (2009) os níveis de intervenção na família são quatro: Família como Contexto, Família como Cliente, Família como Sistema e Família como Componente da Sociedade - **V**

2. A família enquanto cliente centra-se na avaliação de todos os familiares, em que os seus membros se encontram em primeiro plano e a família em segundo- **F**

3. Os cuidados à família implica conhecer a experiência da família ao longo dos tempos - **V**

4. Todos nós aprendemos sobre família ao fazermos parte de uma, não sendo necessário ensinar sobre família - **F**

5. O enfermeiro pode desempenhar junto da família o papel de formador para a saúde, ensinando sobre o bem-estar e doença à família - **V**

6. O enfermeiro não pode desempenhar junto da família o papel de modificador ambiental, dialogando com a família ou com outros profissionais, no sentido de modificar o maior ou menor ambiente que causa impacto na família - **F**

7. Quando o enfermeiro se centra na família como componente da sociedade, a família é vista como uma das muitas instituições dentro da sociedade sendo a família uma unidade básica - **V**

8. A enfermagem de família enquanto sistema vê esta como um sistema interativo, em que as interações entre os membros da família se tornam alvo das intervenções da enfermagem - **V**

9. Os enfermeiros não necessitam de formação sobre famílias porque têm experiências pessoais com as suas próprias famílias - **F**

10. A enfermagem de família contexto, o alvo é o indivíduo e a família serve de contexto ao indivíduo, como um recurso - **V**

11. A participação das mulheres no mercado de trabalho não contribuiu para as mudanças ocorridas nos papéis da família - **F**

12. A enfermagem de família está indicada nas famílias cujos membros são doentes - **F**

13. A saúde familiar está relacionada pelo grau de saúde ou de doença individual. A enfermagem de família é destinada às famílias cujos membros são todos saudáveis - **F**

14. Quando o enfermeiro na sua intervenção com a família trabalha o todo, ajudando a família a reoganizar-se, a intervenção decorre na família como contexto. - **F**

15. Alguns fundamentos teóricos e visões do mundo, nomeadamente o pós-modernismo influenciaram a visão da família - **V**

16. O fim de uma única visão do mundo (pluralismo) evidencia que existem tantos caminhos para entender e experimentar a doença quanto existem famílias tendo a experiência de doença - **V**

17. A cibernétic demonstra a capacidade de autorregulação dos sistemas familiares. "O exemplo clássico utilizado (...) foi o de termóstato" - **V**

18. A biologia da cognição influenciaram a visão da família, ou seja, o mundo que cada um vê não é um mundo, mas o mundo que nós criamos juntamente com os outros - **V**

19. A teoria da comunicação influenciaram a intervenção na família ressalva que toda a comunicação não verbal não é significativa, não existindo algo como a não comunicação - **F**

20. Os fundamentos teóricos da enfermagem de família decorrem das Ciências Sociais, da Terapia Familiar e Enfermagem- **V**

A.5 Family Assessment

1. O modelo de Calgary de Avaliação da Família é uma estrutura multidimensional composta por três categorias: Estrutural, Desenvolvimento e Funcional - **V**

2. O genograma e Apgar familiar são instrumentos para realizar intervenção familiar - **F**

3. O Apgar familiar é um diagrama com representação esquemática e simbólica do relacionamento entre gerações - **F**

4. O Ecomapa é uma representação visual da unidade familiar, em relação à comunidade, mostra a natureza das relações entre os membros da família e entre eles e o mundo que os rodeia - **V**

5. Numa entrevista à família em 20mn dois ingredientes chave são realizar perguntas terapêuticas e elogiar as forças da família - **V**

6. A intervenção de enfermagem na família decorre da mesma forma ao longo do ciclo vital da família - **F**

7. Ao avaliar a família segundo o modelo de Calgary de Avaliação da Família, no âmbito da estrutura é necessário que o enfermeiro conheça a sua estrutura interna, externa e o seu contexto - **V**

8. A avaliação inicial da família difere da avaliação do indivíduo porque a avaliação familiar foca-se numa família como conteúdo, cliente, sistema e componente social - **V**

9. No genograma uma circunferência significa um elemento do sexo masculino - **F**

10. No genograma uma linha quebrada significa uma relação de conflito - **V**

11. No genograma duas linhas paralelas colocadas entre dois indivíduos significa uma relação forte - **V**

12. Ao avaliar uma família de acordo com o segundo modelo de Calgary na categoria estrutural, no que se refere ao contexto pesquisa a etnia, a raça, a classe social, religião e espiritualidade, e o ambiente - **V**

13. Na avaliação familiar, a espiritualidade não influencia os valores, crenças e cuidados de saúde da família - **F**

14. Os Genogramas e os Ecopamas apenas devem ser usados em famílias, se o enfermeiro estiver a trabalhar com todo o grupo- **F**

15. O instrumento de avaliação familiar Face avalia a coesão e adaptabilidade da família - **V**

16. No genograma os membros do agregado familiar em estudo são identificados efetuando um círculo à volta deles - **V**

17. No genograma um quadrado significa um elemento do sexo feminino - **F**

18. O Apgar familiar avalia a funcionalidade e disfunção da família contendo 30 itens de V e F - **F**

19. O genograma é um diagrama do contacto da família com os outros além da família imediata, incluindo a comunidade - **F**

20. Ao avaliar uma família de acordo com o modelo de Calgary na categoria funcional, no que se refere ao carácter expressivo são avaliados os papéis, alianças e uniões - **V**

A.6 Family Intervention

1. Segundo o modelo de Intervenção de Calgary, as intervenções decorrem em três domínios: cognitivo, comportamental e social - **F**

2. As intervenções junto da família podem ser simples nomeadamente através da utilização de perguntas lineares e circulares - **V**

3. No modelo de Calgary, as Intervenções no âmbito do domínio comportamental do funcionamento familiar, referem-se aquelas que oferecem novas informações - **F**

4. As intervenções no âmbito do domínio afetivo do Modelo de Calgary destinam-se a reduzir ou aumentar emoções intensas que podem bloquear as tentativas da família de solucionar problemas - **V**

5. Intervenções como, fornecer informações, informar sobre o tratamento e informar sobre recursos da comunidade, são intervenções do domínio comportamental - **F**

6. A intervenção familiar é o processo pelo qual se empurra a família bloqueada na sua espiral - **V**

7. Segundo o Modelo de Calgary, as intervenções procuram promover melhorias ou sustentar o funcionamento familiar só no domínio cognitivo - **F**

8. Quando o enfermeiro incentiva os membros da família a serem cuidadores, segundo o Modelo de Calgary esta intervenção decorre no domínio comportamental - **F**

9. Quando o enfermeiro incentiva as narrativas da doença, segundo o Modelo de Calgary esta intervenção decorre no domínio afetivo - **V**

10. Alguns processos favorecedores da resiliência familiar podem ser estimulados pelos profissionais de saúde nomeadamente o extrair significado da adversidade - **V**

11. Na intervenção familiar, a finalidade das perguntas circulares consiste em produzir alteração do comportamento - **V**

12. A utilização do elogia na intervenção na família assume particular importância ajudando a encontrar novas soluções para reduzir o seu sofrimento - **V**

13. As intervenções de enfermagem junto da família podem ocorrer em vários domínios. A alteração num destes domínios não afetará os outros - **F**

14. A utilização de perguntas circulares na intervenção de enfermagem destinam-se apenas a informar o enfermeiro - **F**

15. A inclusão do elogio, sempre baseados em comportamentos observados, permitem à família ter uma visão de si própria e assim olharem para os problemas de saúde de uma maneira diferente - **V**

16. Não é possível ao enfermeiro conduzir uma entrevista com uma família em apenas 20mn - **F**

17. Uma das contraindicações para trabalhar com famílias, consiste quando todos os membros afirmam não desejarem participar das reuniões ainda que recomendadas, ou a família prefere trabalhar com outro profissional - **V**

18. Quando o enfermeiro na sua intervenção toma por foco de ação exclusiva o ensino ao prestador de cuidados com vista ao regresso a casa, a sua intervenção decorre na família como sistema - **F**

19. A intervenção na família adquire como principal finalidade a mudança, fornecendo meios de conceber um ajuste entre as funções familiares alteradas e as intervenções de enfermagem - **V**

20. A intervenção na família permite fortalecer as forças da família encorajando o processo ativo de reestruturação e crescimento - **V**

A.7 Clinical Cases

1. Numa visita domiciliária, o enfermeiro depara-se com uma discussão entre o familiar cuidador e outro membro da família. Confrontado com a situação sobre a adequação dos cuidados à pessoa dependente, o que faria?

    - Não tomaria partido de nenhum dos elementos
    - Criava uma aliança com o cuidador familiar
    - Tomaria partido da pessoa dependente

    Correct answer: Não tomaria partido de nenhum dos elementos

2. Numa consulta de saúde infantil, gera-se uma discussão entre o casal sobre os hábitos alimentares da criança. Os discursos são contraditórios, em quem deve acreditar? O que deve fazer?

    - Ouvir a criança
    - Convidar os pais a falar sobre os desafios que envolvem criar uma criança
    - Ouvir separadamente cada um dos progenitores

    Correct answer: Convidar os pais a falar sobre os desafios que envolvem criar uma criança

3. O enfermeiro convocou a filha de um dos doentes para a ensinar a alimentar o seu pai por sonda nasogástrica. À chegada ao serviço a filha recusa-se a aprender sendo agressiva para o enfermeiro. O que faria nesta situação?

    - Agendava o ensino para outro dia
    - Registava no processo que a filha recusou o ensino
    - Providenciava um local calmo para validar ou normalizar respostas emocionais

    Correct answer: Providenciava um local calmo para validar ou normalizar respostas emocionais

4. O enfermeiro do serviço B convoca a família para planeamento da alta do Sr.João, após o aparecimento de uma doença súbita e incapacitante. Perante algumas dificuldades no encaminhamento, o que deve fazer o enfermeiro?

- Facilitar e ajudar a própria família a encontrar as suas próprias soluções
- Propor o que o enfermeiro considera ser adequado para esta família
- Encaminhar para outros profissionais

Correct answer: Facilitar e ajudar a própria família a encontrar as suas próprias soluções

5. O Sr.Pedro é internado para realizar uma cirurgia no serviço B, tendo sido acompanhado pela esposa e a filha. À chegada ao serviço a família pede para falar com o enfermeiro. Dado o volume de trabalho desse turno, o que deve fazer o enfermeiro?

   - Encaminhar para outros profissionais, falar com as famílias não faz parte do trabalho
   - Realizar uma entrevista breve, não superior a 15 minutos
   - Se falar com a família não vai ter tempo para as restantes atividades

   Correct answer: Realizar uma entrevista breve, não superior a 15 minutos

6. Numa primeira consulta sobre uma nova etapa do ciclo vital, formação do casal, que integra aspetos relacionados com o ajuste conjugal, a expansão do relacionamento com a família extensa e a necessidade de redefinição de papéis. O que enfermeiro faria?

   - Colocava perguntas, convidando a explorar e refletir sobre os significados
   - Fornecia aconselhamentos, dando opiniões e recomendanções
   - Abordar o conhecimento sobre o planeamento familiar

   Correct answer: Colocava perguntas, convidando a explorar e refletir sobre os significados

7. A Dona Lurdes, cuidadora da mãe há cerca de 10 anos refere não ser capaz de continuar a cuidar. Perante a hipótese de sobrecarga, convoca toda a família para uma entrevista. Na entrevista, o que é que o enfermeiro decide?

   - Ao longo da entrevista considera dar mais ênfase à Dona Lurdes
   - Convidar todos os elementos da família a descrever o seu significado
   - Realizar uma entrevista breve, não superior a 15 minutos

   Correct answer: Convidar todos os elementos da família a descrever o seu significado

8. A família Ramos integra um elemento dependente há cerca de 2 anos. A Dona Maria foi diagnosticada com uma ELA, e desde essa altura o funcionamento da família mudou. Na visita domiciliária o enfermeiro decide integrar o elogio na entrevista. Porquê?

   - Porque a integração do elogio permite detetar as forças da família
   - Porque o elogio é uma forma de cumprimento
   - Porque o elogio é obrigatório

Correct answer: Porque a integração do elogio permite detetar as forças da família

9. Numa visita domiciliária, o enfermeiro depara-se com a seguinte situação: Os elementos da família discutem acerca da repartição de tarefas relativas à pessoa dependente sem chegar a um consenso. O que deve o enfermeiro fazer?

    - Tomar a dianteira e distribuir as tarefas pelos diferentes elementos da família
    - Reunir com a família para saber a disponibilidade e vontade de cada elemento da família em participar
    - Abster-se de se incluir na conversa"

    Correct answer: Reunir com a família para saber a disponibilidade e vontade de cada elemento da família em participar

10. Numa visita domiciliária ao recém-nascido e pai/mãe, o enfermeiro percebe uma tensão enorme entre o casal. O que deve fazer o enfermeiro?

    - Centrar-se nos cuidados ao recém-nascido
    - Ouvir a mãe/pai sobre as preocupações desta nova fase do ciclo vital
    - Dizer para terem calma

    Correct answer: Ouvir a mãe/pai sobre as preocupações desta nova fase do ciclo vital

11. Numa visita domiciliária, numa situação de doença terminal, a família discute se deve ou não levar o seu familiar para o hospital, gerando-se um ambiente tenso. O que deve fazer o enfermeiro?

    - Questionar a família e o doente sobre os seus desejos e analisar as alternativas
    - Apoiar a ida para o hospital
    - Ignorar a situação

    Correct answer: Questionar a família e o doente sobre os seus desejos e analisar as alternativas

12. Durante o internamento hospitalar, aquando da preparação da família para levar o seu familiar dependente para casa, o enfermeiro percebe que a família está agitada e relutante em assumir este papel. O que deve fazer o enfermeiro?

    - Reunir com a família para perceber os significados que a família atribui a esta situação
    - Preparar a família sem referir este assunto desconfortável
    - Chamar mais elementos da família

    Correct answer: Reunir com a família para perceber os significados que a família atribui a esta situação

13. Na etapa do ciclo de vida familiar em que os filhos adultos saem de casa, em que deve o enfermeiro ajudar a família?

    - Apoiar a saída dos filhos
    - Pensar positivamente
    - Redefinir e ajustar papéis familiares e significados com a família

    Correct answer: Redefinir e ajustar papéis familiares e significados com a família

14. Uma das formas de ajudar a família a conscializar-se da sua situação é através de:

    - Um questionário
    - Questionamento circular
    - Perguntas fechadas dirigidas ao problema

    Correct answer: Questionamento circular

15. Durante o internamento hospitalar, devemos preparar a família para regressar a casa, perante a nova situação:

    - Sempre que envolver uma pessoa que fica dependente, pois pode exigir um cuidador
    - Apenas quando há a mudança de uma das fases do ciclo de vida da família
    - Em todas as situações que leva a família à necessidade de adaptação a uma nova situação

    Correct answer: Em todas as situações que leva a família à necessidade de adaptação a uma nova situação

16. Numa visita domiciliária de vigilância da saúde de um idoso, devemos:

    - Avaliar apenas o idoso e a situação
    - Reunir com a família, aproveitando a oportunidade de visitação do idoso
    - Focarmo-nos no objetivo da visita

    Correct answer: Reunir com a família, aproveitando a oportunidade de visitação do idoso

17. A preparação da família para receber uma pessoa dependente, exige que o enfermeiro tenha como prioridade:

    - Recolher a informação sobre o cuidador
    - Centrar-se na pessoa dependente, que é quem está internada
    - Reunir com a família, explorar condições da família, dos elementos e condições do edifício residencial

    Correct answer: Reunir com a família, explorar condições da família, dos elementos e condições do edifício residencial

Appendix B

Google Forms Questions

The feedback collection was done in Portuguese.

B.1 Consent

Declaro ter lido e compreendido as informações fornecidas. Aceito participar neste estudo e concordo em fornecer os dados necessários. Entendo que os meus dados serão usados apenas para esta pesquisa, garantindo confidencialidade e anonimato.

- Sim
- Não

B.2 Data

In this section the answers are selection where the user only ticks one of the available options.
Gênero

- Feminino
- Masculino

Idade (resposta numérica)
Grau Acadêmico

- Estudante de Enfermagem
- Bacharelato de Enfermagem
- Licenciatura em Enfermagem
- Mestrado
- Doutoramente

Especialização

- Enfermagem Comunitária
- Enfermagem Médico-Cirúrgica
- Enfermagem de Reabilitação
- Enfermagem de Saúde Infantil e Pediátrica
- Enfermagem de Saúde Materna e Obstrétrica
- Enfermagem de Saúde Mental e Psiquiátrica
- Nenhuma

Anos de experiência profissional (resposta numérica)
Atividade Profissional

- Docência
- Enfermeiro na prática clínica
- Gestor
- Outra

Experiência em Enfermagem à Família

- Sim
- Não

País de atividade profissional

- Portugal
- Brasil
- Espanha
- Outra Opção... (Necessário Especificar)

B.3 Experience

Área de Experiência em Enfermagem à Família (Se respondeu que sim na questão de Experiência em Enfermagem à Família)

- Prática Clínica
- Ensino
- Investigação
- Outra Opção... (Necessário Especificar)

B.4 Application Evaluation

In this section all questions have 5 answer options: 1 - Strongly Disagree, 2 - Disagree, 3 - Neutral, 4 - Agree and 5 - Strongly Agree. The user can only select one option in each statement.

Com base na experiência que teve com a aplicação, por favor, compartilhe a sua opinião sobre cada uma das declarações a seguir

- A utilização deste instrumento contribui para a melhor compreensão dos conteúdos sobre família
- Considera que os conteúdos abordados neste instrumento foram úteis ao desenvolvimento da sua atividade profissional
- O tempo destinado a aplicabiliade deste instrumento é adequado
- Os temas deste instrumento são apresentados de modo claro e coerente
- O conteúdo do instrumento é adequado entre a teoria e a prática
- Considera que a aprendizagem deste instrumento terá impacto ao nível do seu desempenho na prática
- Sentiu evolução dos seus conhecimentos na área da família com a utilização deste instrumento
- Pretende aplicar os conhecimentos adquiridos com esta atividade
- Os conteúdos desenvolvidos foram em quantidade adequada ao seu nível de conhecimentos
- O momento proporcionado nesta atividade incentivou a participação dos formandos
- A utilização deste instrumento contribui para a motivação dos formandos
- Considera que esta metodologia é útil para a aprendizagem
- A duração desta atividade é adequada para permitir aprendizagem
- Recomendaria os conteúdos abordados nesta atividade a outras pessoas
- Este instrumento é útil para rever conhecimentos da família
- A utilização deste instrumento é um bom recurso para despertar interesse sobre o tema
- Este instrumento é útil para diagnosticar lacunas no âmbito da família
- Este instrumento ajuda a reter conhecimentos específicos sobre intervenção em família
- Este instrumento é uma estratégia de ensino adequada para aquisição de competências
- Globalmente esta estratégia foi para mim satisfatória

B.5 Usability

In this section all questions have 5 answer options: 1 - Strongly Disagree, 2 - Disagree, 3 - Neutral, 4 - Agree and 5 - Strongly Agree. The user can only select one option in each statement.

Com base na experiência que teve com a aplicação, por favor, compartilhe a sua opinião sobre cada uma das declarações a seguir

- A interface da aplicação era intuitiva e fácil de usar
- Os elementos de navegação eram claros e compreensíveis
- Os botões e controles da aplicação eram responsivos
- A organização das informações na aplicação era lógica e coerente
- A fonte de texto e o tamanho eram legíveis
- A funcionalidade da aplicação atendeu às suas expectativas
- A aplicação apresentou algum problema técnico durante o uso
- As respostas às suas ações na aplicação foram imediatas
- Encontrou alguma dificuldade específica ao usar a aplicação
- A página inicial apresentava de forma clara as categorias de perguntas disponíveis
- O ranking do utilizador e os pontos de XP foram exibidos de maneira fácil de entender na tela inicial
- A navegação por meio da barra de navegação inferior foi intuitiva e fácil de usar
- Conseguiu facilmente acessar o seu perfil na aplicação e entender o que estava a ser aprensentado
- A funcionalidade de voltar à página inicial a partir de outras telas era clara e acessível
- O glossário fornecido na aplicação foi útil para esclarecer termos ou conceitos relacionados
- As transições entre telas foram suaves e não causaram confusão
- As informações exibidas em cada página eram relevantes e de fácil compreensão
- A disposição dos elementos na tela era equilibrada e esteticamente agradável
- A barra de progresso foi útil para indicar o progresso do quiz
- O número da questão foi claramente visível e fácil de acompanhar
- As perguntas foram apresentadas de forma clara e compreensível

- Houve alguma dificuldade em selecionar a opção de resposta desejada
- O design da tela de quiz foi atraente e agradável visualmente
- Houve alguma confusão ou dificuldade em navegar entre as questões

B.6 Motivation and engagement

In this section all questions have 5 answer options: 1 - Strongly Disagree, 2 - Disagree, 3 - Neutral, 4 - Agree, and 5 - Strongly Agree. The user can only select one option in each statement.

Esta seção tem como objetivo avaliar a sua experiência como utilizador durante o uso da aplicação. Se sentiu motivação e engajamento ao utilizar a app e se esta despertou interesse em aprender mais sobre tópicos relacionados à enfermagem familiar.

- Sentiu-se motivado a utilizar a aplicação
- O design e a aparência da aplicação foram atraentes e cativantes
- Sentiu que a aplicação incentivava a sua participação ativa
- As recompensas como pontos XP e leaderboard/rank aumentaram a sua motivação para continuar a usar a aplicação
- O uso desta aplicação despertou o seu interesse em aprender mais sobre tópicos relacionados à enfermagem familiar
- Encontrou desafios suficientes durante o jogo que o manteve motivado
- O feedback fornecido pela aplicação, como a pontuação, contribuiu para a motivação
- A aplicação ao longo do tempo tornou-se monótona
- As funcionalidades sociais como o rank do utilizador incentivaram a uma competição saudável e aumentaram a sua motivação
- Com base na experiência geral, recomendaria esta aplicação a outros profissionais de enfermagem

B.7 Others

In this section, the questions are development answers that serve for more composed feedback by the user as well as the opportunity to suggest improvements or features.

- Verificou erros ou inconsistências durante o uso da aplicação?
- Indique aspetos favoráveis em relação à aprendizagem com esta aplicação

- Indique aspetos desfavoráveis em relação à aprendizagem com esta aplicação
- Tem alguma sugestão de melhoria em relação à interface da aplicação?
- Outras sugestões

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