**CHAPTER I**

**THE PROBLEM AND ITS BACKGROUND**

INTRODUCTION

Nutrition and Dietetics are critical components of maintaining a healthy and vibrant life for individuals of all ages, backgrounds, and cultures. The study of food, its nutritional content, and its effects on the body are all included in this area. A healthy, balanced diet is essential for preventing chronic conditions including cancer, diabetes, and heart disease. Understanding the fundamentals of healthy eating, such as eating a balanced diet composed of a range of fruits, vegetables, whole grains, lean meats, and healthy fats, is necessary for proper nutrition. The body receives the vital vitamins, minerals, and nutrients from a balanced diet that are needed for healthy biological processes. A nutrient-rich diet can lower the chance of developing chronic illnesses, encourage weight loss and management, and enhance general health.

In recent years, there has been a growing awareness of the importance of proper nutrition and dietetics in preventing and treating chronic diseases. For example, research shows that diets rich in fiber, such as whole grains, fruits, and vegetables, can reduce the risk of heart disease and certain types of cancers. Similarly, reducing the intake of processed and high-sugar foods can reduce the risk of developing type 2 diabetes and obesity. (Mozaffarian et al.)

To promote healthy eating habits, governments worldwide have implemented policies and initiatives to increase access to nutritious foods and encourage healthy eating behaviors. For instance, some countries have introduced taxes on sugary drinks to reduce consumption, while others have launched campaigns to promote the consumption of fresh fruits and vegetables. (World Health Organization)

The field of nutrition and dietetics plays a crucial role in addressing public health concerns in the Philippines, particularly issues related to malnutrition and obesity. According to the Food and Nutrition Research Institute, the prevalence of underweight children under five years of age in the country decreased from 33.4% in 1993 to 26.2% in 2015. However, the prevalence of stunting among children under five years old remains high at 30.3% in 2015, while wasting affects 7.1% of the population in the same age group (FNRI).

The Philippine government has implemented several programs and initiatives aimed at addressing malnutrition and promoting healthy eating habits. One such program is the *"Pinggang Pinoy"* campaign, launched in 2014 by the Department of Health (DOH) in collaboration with the Food and Nutrition Research Institute (FNRI) and the National Nutrition Council (NNC). The campaign promotes healthy eating habits by encouraging Filipinos to consume a balanced meal, consisting of food items from the following groups: rice, vegetables, fruits, protein-rich foods, and fats/oils.

Nutrition and dietetics students in the Philippines have an important role to play in addressing public health issues related to malnutrition and obesity in the country. As future nutrition professionals, they can contribute to improving the nutritional status of the population by incorporating the principles of government-led programs and initiatives such as the *"Pinggang Pinoy"* campaign into their practice. Additionally, nutrition and dietetics students can conduct research, evaluate the effectiveness of existing programs, and develop new initiatives aimed at promoting healthy eating habits and addressing malnutrition.

One of the challenges faced by nutrition and dietetics students in the Philippines is the reliance on manual assessments to evaluate the nutritional status of patients. While manual assessments, such as anthropometric measurements and dietary recall, are useful, they can be time-consuming and may not provide an accurate assessment of an individual's overall health.

In contrast, the use of technology in nutrition assessment has become increasingly popular in recent years. Various tools, such as mobile apps, wearable devices, and web-based platforms, have been developed to provide more accurate and efficient methods for nutrition assessment. These tools can collect and analyze data quickly and accurately, providing a more detailed picture of an individual's nutritional status.

However, the adoption of technology in nutrition assessment among nutrition and dietetics students in the Philippines has been slow. This may be due to a lack of access to technology and training in its use, as well as cultural attitudes towards technology in healthcare.

To address this challenge, it is crucial for nutrition and dietetics programs in the Philippines to integrate technology into their curriculum and provide students with the necessary training and resources. Additionally, the Philippine government and healthcare institutions can invest in technology infrastructure to improve access to and adoption of technology in healthcare.

The field of nutrition and dietetics is constantly evolving, and with the advancements in technology, there is a growing need for innovative solutions that can enhance the learning experience of students. In this regard, a team of researchers came up with a groundbreaking idea to develop “NutriWISE: Nutritional Wellness Information System and Education for Nutrition and Dietetics Students” that aids the Batangas State University-ARASOF Nutrition and Dietetics students. The proposed system is expected to be a game-changer in the field of nutrition and dietetics. The web and mobile application provided the students with an intuitive and user-friendly interface that enabled them to track their progress and achieve their academic goals more effectively. Additionally, the proposed system is designed to be customizable, allowing students to tailor their learning experience to their unique needs and preferences. The primary benefits of the proposed system are that it enables students to achieve accurate anthropometric measurements and dietary recall. This is a critical aspect of nutrition and dietetics, and having access to an accurate and reliable platform enhances the quality of education that students can receive. In the proposed system, students can practice and perfect their skills in a safe and supportive environment.

Background and Settings of the Study

The Batangas State University ARASOF-Nasugbu campus’ College of Nursing and Allied Health Sciences (CONAHS) Department program of Nutrition and Dietetics was initially offered at the campus starting from A.Y. 2012-2013, in line with the basic requirements of the Commission on Higher Education as stipulated in CMO No.54, series of 2006. The said program has the following objectives for their enrolled students, these are as follows: (a) Encourage the importance of dietetics and nutrition for people's health, taking into account their requirements, resources, and potential as individuals, communities, and families. Show that you have the capacity to organize and oversee a food service operation in a hospital or other setting. (b) Employ the idea of holistic nutritional care for people's overall wellness in interdisciplinary and multicultural contexts, and incorporate nutrition issues with regional and international development initiatives. (c) Oversee nutrition programs for people, groups, and organizations, and devise and carry out a financially sustainable nutrition and dietetics activity. (d) Design and carry out a financially viable nutrition and dietetics-related activity. Have the capacity to plan and/or carry out a research investigation on food, nutrition, and related themes. (e)  To behave in a way that is consistent with the industry's moral guidelines and engage in lifelong learning activities. (Batangas State University)

Nutrition is the study of how food impacts the body's ability to grow, maintain itself, and maintain its health. The impact of vitamins and minerals as well as macronutrients (carbs, proteins, and fats) and micronutrients (vitamins and minerals) on numerous bodily processes is also studied. On the other hand, the field of dietetics focuses on the practical application of nutrition knowledge to assist people in choosing nutritious foods and managing a variety of health concerns. Dietetics and nutrition work hand in hand to prevent and treat diseases, preserve good health, and promote wellness. Dietitians provide individualized meal plans and instruct people on healthy eating practices using their understanding of nutrition. They also aim to promote healthy eating and stop malnutrition in a variety of contexts, including hospitals, schools, and community organizations.

The present teaching methods for the Bachelor of Science in Nutrition and Dietetics (BSND) is somehow effective, but still time consuming. The lack of resources is a big drawback in giving the students the capability to address their individual performance. Batangas State University supports its nutrition and dietetics students in creating meal plans by utilizing the data from their clients' anthropometric measurements and assessments. Despite their ability to conduct assessments with great precision, there is still a possibility of human error. The accurate measurement of dietary intakes for populations is vital for evaluating and monitoring the nutritional content and quality of diets, examining the connection between diet and health, and providing guidance for food, nutrition, and agricultural initiatives and policies. However, assessing food intakes is a challenging and intricate endeavor.

In terms of assessing the meal plan creation, it is critically important to address a lot of things like the patient’s opinion and their knowledge of the proper food to add in the meal plan. However, it consumes too much time on the student’s end, from the gathering of information about the anthropometric measurements, the long computation, the distribution of the result calories, to the one-by-one addition of foods per servings and proper intended calories by basing on a guidebook. It is important to know that the time intended for creating the meal plan eats up a huge amount of time on both the student and the patient themselves. Digitizing the process would be of big help to the students since they can do it through an app operated onto their phones without consuming too much time, and perks for the patient since they can receive their projected meal plans earlier than expected.

Integration of nutrition and dietetics students into dietician activities, staff involvement in addressing the unique learning requirements of each student, and creative teaching strategies are all necessary components of effective clinical learning. Examining the characteristics of practice environments might offer insightful information for improvement.  Once deployed onto nutrition education roles in their OJT’s and respective careers ahead of them, five notions should be noted in relation to how nutrition and dietetics students perceive their professional selves, given that these themes are the main ones that the courses' enrolled students are encouraged to pursue and aim for: (1) A passion for the nutrition and dietetics field; (2) Nutritionists and Dieticians numerous functions; (3) Personal qualities that a good dietician must possess; (4) Greater knowledge of the nutrition education field; and (5) A better understanding among the interactions between patients and nutritionists, patients and doctors, and doctors and nutritionists. Once deployed for clinical duty and an environment fitting them, they should be observed with proper cultivation on grasping and developing their knowledge in proper nutrition and identity among the dietetics field. (Wang)

Effective clinical learning calls for the use of creative teaching techniques, staff involvement in meeting the unique learning needs of each student, and integration of dietetics students into ward operations. It might be possible to make progress by learning more about the features of practice environments.

STATEMENT OF THE PROBLEM

The main purpose of the project is to give the Nutrition and Dietetics student and course facilitator of Batangas State University-ARASOF an advantage to other school and help them to adapt the real-world situation in the nutrition and dietetics field with the use of modern technology.

Specifically, it will attempt to answer the following questions:

1. What are the issues encountered by the Nutrition and Dietetics students in terms of performing an assessment with their patient/s?
2. What are the issues encountered by the course facilitators of the program in terms of performance assessment of Nutrition and Dietetics students?
3. What are the components needed by the Nutrition and Dietetics students in the courseware that would primarily improve quality of performance?
4. What is the level of satisfaction of the Nutrition and Dietetics students on the proposed system in terms of:
   1. Portability,
   2. Handiness,
   3. Proficiency and,
   4. Performance?
5. What is the level of acceptance of the course facilitators of the Nutrition and Dietetics program on the proposed system in terms of:
   1. Correctness,
   2. Accuracy and,
   3. Usability?

SIGNIFICANCE OF THE STUDY

The study aimed to develop and design a Mobile and Web-Based Application for Nutrition and Dietetics Students for the benefits of the following:

**BatStateU ARASOF**. Through this system, the University can attract more student of Nutrition and Dietetics in the future to enrolled in the university, since they are willing to adapt present trends of medical technology.

**College of Nursing and Allied Health Sciences (CONAHS)**. The cost of printing assessment materials will be reduced since the assessment and evaluation for the students will be a web-based and mobile application. The funds allocated for these items can then be utilized to upgrade the system, add more medical equipment, or build new facilities.

**Students**. The nutrition and dietetics of Batangas State University-ARASOF will be less confused if they have access to this type of application, which is implemented in modern hospitals or healthcare facilities.

**Faculty**. The faculty may quickly assign tasks to students by giving them and monitoring their progress on them. They can also examine the grades or outcome of the student's job in real time.

**Dean**. The system will assist the CONAHS Department Dean in making sure that the faculty provide the great education that the institution offers.

**Researchers**. They will have a greater grasp of how the medical industry operates thanks to this study, which will also lead to the development of more community-beneficial technologies and apps.

**Future Researchers**. They may use this study as a guide when working with similar study and for future improvement.

SCOPE AND LIMITATION OF THE STUDY

The proposed application’s target group are the CONAHS department from Batangas State University-ARASOF Campus. It involves the usage of modern technology integrated into their daily activity.

NutriWISE: Nutritional Wellness Information System and Education for Nutrition and Dietetics Students is a project that aims to provide a mobile application for Nutrition and Dietetics students and their clients, and a web application for the course facilitator of the CONAHS department. There will be three modules: two for both the students and clients using mobile applications, and one for the course facilitator using web-based application.

The mobile application for students is capable of various functionalities. First is for BMI calculation, this will let the students know the BMI of their client when they are performing an assessment, the application automatically calculates the BMI by just getting the client age, height, and weight. Desirable body weight calculation, the platform also includes a tool that calculates the desirable body weight for a given height and body frame size, based on established formulas and guidelines. After getting client’s anthropometric measurements the student will input the number of exchanges. The system automatically gives the list of food and the student will choose the right food based on the exchanges. Course Materials, NutriWISE also provides course materials for students.

The web application for course facilitators has different capabilities. Resource management, NutriWISE provides resource management tools to help course facilitators manage educational resources, such as various course materials and assign them to specific students or groups. Analytics dashboard, the NutriWISE also provides an analytics dashboard that aggregates student performance data and provides insights into student progress, areas of difficulty, and learning trends.

The mobile application for the client will have a sole purpose. Meal plan viewing, NutriWISE can provide the created and generated meal plan of the students for the client to follow.

DEFINITION OF TERMS

Before delving into the specifics of the project, it is important to clarify some key terms that will be used throughout. These terms are essential for understanding the scope and objectives of the project and for communicating effectively about its goals and outcomes.

Analytics dashboard – a set of data organized on a user interface with a clear focus on essential metrics.

React Native – the IDE that the researchers used to develop their propose mobile application.

Anthropocene – The geological era that denotes the point in history when human actions started causing observable changes in the planet's climate and ecosystems is called a geological time unit.

Anthropometric measurements – body mass index (BMI) and waist and hip measurements of the client that were needed for generating a meal plan.

BMI – body mass index, a measurement of body fat for adult men and women based on height and weight.

Cardiometabolic diseases – heart attack, stroke, diabetes, insulin resistance, and non-alcoholic fatty liver disease, are common but often avoidable health problems.

Cascading Style Sheets (CSS) – A stylesheet language used to describe the presentation of a document written in HTML. This was used in designing the system in this study.

Catabolic illnesses – an illness that causes rapid weight loss, loss of fat and muscle mass, and may be accompanied by an acute, self-limited illness (such as an injury or infection) or a chronic illness (such as diabetes, diabetic ketoacidosis, multisystem organ failure, AIDS, advanced cancer, chemotherapy, or radiation therapy).

Clients – the people who will be assessed by the nutrition and dietetics student.

CONAHS – College of Nursing and Allied Health Sciences, the department in Batangas State University-ARASOF that will be benefited in the proposed system.

Faculty members – are educators and researchers who are responsible for teaching Nutrition and Dietetics students. They are the one who will assign a task and give an assessment to the students using the system.

Food Exchange List – a user-friendly application was created to assist people in developing good eating habits and following a certain diet plan.

HTML – Hypertext Markup Language, the markup language that is used by the researchers for them to develop their web application that will be used by the course facilitator.

JavaScript – one of the programming languages that is used for developing the web application and gives the functionality to the web application.

Meal Plan – list of foods that will be generated by the nutrition and dietetics students that will be given to the client.

Morbidity – often refers to diseases that are age- and chronic (long-term) in nature. The quality of life and health of a person may be affected over time as these develop.

MyFitnessPal – is a well-known weight-loss app that applies concepts from social cognitive theory.

MySQL – a free and open-source relational database management system. In this study the researchers used this as their database for storing the data that is needed for the developed system.

Nutrition and Dietetics students – the target of the proposed system and will mostly use the system.

Riskmatenflex – a web-based tool for nutritional evaluation was developed for the Swedish National Dietary Survey of Adolescents.

Web and mobile applications – This will be the platform for the proposed system and will be used by the target group.

Well-D – a smartphone app for monitoring one's nutrition, created to evaluate and track food consumption.

**CHAPTER II**

**RELATED LITERATURE**

CONCEPTUAL LITERATURE

NutriWISE:Nutritional Wellness Information System and Education for Nutrition and Dietetics Student is a web-based system and mobile application that will help the nutrition and dietetics students at the Batangas State University-Arasof Nasugbu Campus to perform their assessment task with their client easily and faster. The computation of client’s anthropometric measurements and choosing the right meal based on the number of exchanges using their book is time consuming but NutriWISE can help resolve this problem.

Understanding nutrition may be a very difficult process. One has to spend a lot of time reading through many journals, articles, textbooks, or talking to physicians or nutritionists in order to find solid information, and even then, it might not be enough. This information monopoly is beginning to shift as a result of modern technologies. The world of nutrition is becoming simpler to understand thanks to technology, which is also providing us with the resources the researchers’ need to make better, more educated decisions for ourselves (Aakriti). Technology developments provide fresh opportunities for scientific study that will help us better comprehend information systems. In order to progress research and provide patients with the best advice possible, practitioners and researchers can expand on established techniques utilizing a variety of evaluation tools (The Nutrition Society).

Dietitians advise their clients to adopt a variety of applications that can help them stay on track with eating a balanced, nutritious diet. Several software companies work to develop tools or programs that can help people, and they work with dietitians to provide reliable data that can be put into the software. Experts in food and nutrition, dietitians may contribute to the development of future technologies by creating and implementing nutrition informatics systems. Technology has the ability to increase output, improve clients, promote nutrition and overall health (Hicks).

According to the United Nations System Standing Committee on Nutrition's report called "Nutrition in a Digital World," released in June 2020, digital technologies play a crucial role in revolutionizing food systems and enabling the creation and delivery of effective food and nutrition interventions. The report discussed various digital technologies, such as mobile phone technology for enhancing the nutritional status of adults and children in low-income countries, artificial intelligence (AI) to improve food security, and big data for enhancing food security (Graber).

In order to maintain a healthy, balanced diet through food exchange, an individual's meal planning system can employ the Food Exchange List (FEL), which provides extensive information on the nutrients of foods and drinks. It is also useful for calculating the quantity of protein, fat, carbs, and energy that comes from the food. This book definitely helps nutrition and dietetics students to have knowledge about their field. In order for them to gain more knowledge they need to do some volunteering or by joining campus events about nutrition (Todini).

The Batangas State University helps their nutrition and dietetics students to generate a meal plan based on the results of their computation in their clients’ anthropometric measurements and assessment. Although they can do their assessment perfectly it can still lead to human error. To evaluate and monitor the content and quality of diets, to look into the relationship between diet and health, and to guide food, nutrition, and agricultural programs and policies, accurate measures of dietary intakes for populations are crucial. Yet, evaluating food intakes is a difficult and complex task. (Gibson et al.).

In order to address this problem, this study developed a web-based and mobile application for course facilitator and nutrition and dietetics students of Batangas State University - ARASOF Nasugbu Campus. This application will help the course facilitator to give remarks to their students based on the performance of the students. The students can use the application to view their task that the course facilitator assigned to them. Also, the application can be used by the student by inputting the anthropometric measurements of their client and generating meal plans for them.

RESEARCH LITERATURE

The goal of nutrition and dietetic research is to improve human health through advancing science, translating findings, and having a positive effect on future users. People frequently place their attention on a hierarchy of research evidence that favors primary data from clinical trials and studies as well as systematic evaluations of randomized controlled trials. Nonetheless, all healthcare disciplines, including dietetics, benefit greatly from research that makes use of or focuses on teaching and training.

In public hospitals in the Philippines, which mostly serve individuals with low incomes, there is an issue with the quality of nutrition services and inpatient meals. To provide Philippine public hospitals with the inputs and frameworks required to deliver high-quality nutrition care and inpatient meals that will facilitate patient recovery and overall patient health, moving forward, a systems approach involving the Department of Health, its regional offices, and hospital management is necessary (Casas et al.).

If education provided by dietitians is inadequate, the workforce will not be capable of serving communities, healthcare services, and complex systems, like how an uneaten meal has no nutritional value. This month, the researchers are releasing a virtual issue that highlights the most important recent articles from the Journal of Human Nutrition and Dietetics that explore methods for enhancing education and training for support nutrition and dietetic professionals as well as other types of health professionals (Mellor).

The importance of medical nutrition education for healthcare professionals to prevent and manage chronic diseases such as obesity, cardiometabolic disease, and cancer. Despite this, many healthcare providers lack the necessary training to affect patient change. The National Heart, Lung, and Blood Institute (NHLBI) of the National Institutes of Health (NIH) organized a workshop to build on the 2012 workshop objectives and identify research gaps and other obstacles impeding the successful implementation of medical nutrition education. The workshop delved into the history of medical nutrition education, drawing on experiences and insights from the Nutrition in Medicine program and the National Nutrition Test Item Bank. The workshop highlighted the need for a nationwide approach to integrating nutrition throughout the curriculum and providing support for teaching faculty and medical school leaders (Horn et al.).

Based on the research titled “Nutrition and Dietetics Students’ Perceptions”, in the field of professional nutrition and dietetic practice, sustainability and sustainable development are increasingly important ideas. This development coincides with appeals from various academic fields and higher education to reframe the research through the Anthropocene and, in some cases, a "climate emergency". The Anthropocene is a paradigm shift because it acknowledges a moment in geological history when human activities have taken over as the primary driver of change in the physical systems of the world (Burkhart et al.).

Several initiatives have been put in place to enhance the medical curriculum's nutrition instruction and encourage the proper delivery of nutrition treatment. To increase nutrition instruction throughout training, several of these approaches are either stand-alone courses or nutrition syllabi integrated within the medical curriculum. To enhance the nutrition care competencies of working doctors, in-service nutrition training programs have also been developed (Amoore et al.).

Craven’s research entitled "Digital Workbooks in Flipped Nutrition Education: Student Perspectives'”, The conventional method of teaching Nutrition and Dietetic (N&D) education involves didactic instruction. However, a new pedagogical approach called the flipped classroom approach (FCA) is gaining popularity in this field. The FCA involves students engaging with the material before class and using class time for interactive discussions and activities. In order to enhance learning, technological tools that provide cognitive support are being used. In the context of N&D education, students have found the FCA to be engaging. However, there is limited evidence on how to effectively integrate technologies into the FCA. This research aims to investigate the perceptions of undergraduate nutrition and dietetic students regarding the use of a digital workbook in nutrition courses that are designed and delivered using the FCA. (Craven)

Based on another study by O-Shea et al. “Using simulation-based learning to provide interprofessional education in diabetes to nutrition and dietetics and exercise physiology students through telehealth”, This study outlines a collaborative learning experience involving nutrition and dietetics students and exercise physiology students through interprofessional simulation-based training. The focus was on the common scenario of interacting with patients diagnosed with type 2 diabetes. The simulation was conducted using a telehealth platform, enabling interprofessional teams to collaborate remotely with simulated patients. Ten nutrition and dietetics students and 13 exercise physiology students participated in the simulation module, which involved observing and jointly developing and delivering an interprofessional treatment plan for diabetic patients. The evaluation of learning outcomes was based on Kirkpatrick's model, assessing reaction, learning, and perceived impact on behavior. The results indicated a significant increase (p < 0.05) in students' confidence in communication, assessment, management, and interdisciplinary collaboration after the activity. Students believed that the simulation-based learning experience would positively impact their clinical skills and ability to work with other healthcare professionals. The most effective aspects of the simulation module, according to students, were the opportunity to learn from and about each other, the hands-on learning experience, and the supportive learning environment. However, the audio quality and delay of the telehealth platform had a negative impact on the learning experience. Nevertheless, the study's positive outcomes demonstrate the potential of simulation-based learning for preparing allied health students to work in interprofessional teams. While the telehealth platform posed limitations in this study, advancements in videoconferencing technology offer opportunities to employ more reliable technology in future simulations. (O-Shea et al.)

Hutchins et al. conducted a study titled "Training interns in nutrition and dietetics: a cross-sectional study of the barriers and motivators to being a Registered Dietitian Nutritionist preceptor," which highlights the significance of hands-on training in the education and preparation of Registered Dietitian Nutritionists (RDNs) and Nutrition and Dietetic Technicians, registered (NDTRs), and the crucial role that professionals in overseeing interns during this training is significant.. The essay notes the increasing demand for RDNs in the United States and the various pathways available to qualify for the registration exam for dietitians and nutrition and dietetic technologists. However, only 47% to 73% of candidates have been accepted for internships over the past 27 years, making preceptors' role in expanding the number of experiential learning opportunities essential. The essay aims to examine the perceptions and attitudes of nutrition and dietetics professionals in the United States towards the preceptor role, as well as any potential incentives for precepting (Hutchins et al.)

Brusilovsky et al.’s research entitled “Web-based education for all: a tool for development adaptive courseware”, entails that, consequently, there is a requirement for systems that can adjust to individuals with diverse backgrounds, varying levels of prior knowledge on a subject, and different learning objectives. One notable type of online educational systems is the electronic textbook. This article outlines a method for creating adaptive textbooks and introduces InterBook, an authoring tool built on this approach. InterBook streamlines the process of developing adaptive electronic textbooks on the internet. (Brusilovsky et al.)

Upton’s research entitled " Online Learning in Nutrition and Dietetics: Student Performance and Attitudes”, The primary objective of this research was to create online educational content in the field of Behavioral Studies specifically tailored for undergraduate students studying Nutrition and Dietetics. Additionally, the study aimed to examine the opinions of students regarding the online material and assess their performance when taught using this innovative approach. The methodology involved Nutrition and Dietetics students completing an online module on health psychology/sociology, and their performance was compared to students who participated in a traditional lecture-based course. The researchers also gathered feedback from students regarding the online course. The findings indicated that students taught through the online medium performed comparably to those taught through traditional lectures. The students generally enjoyed the material, although there was some hesitation in adopting an independent learning style. (Upton)

Digital health technologies are revolutionizing healthcare worldwide to address the increasing problems caused by aging populations with multiple chronic diseases. Through the utilization of personal data and technology-based delivery methods, digital health technologies can help provide tailored nutrition care following the standard Nutrition Care Process (NCP). Across the world, conventional dietetic services are being disrupted by digital technology, providing responsive and effective nutrition therapy. Disruptive technologies mentioned include integrated electronic and personal health records, mobile apps, wearables, artificial intelligence, machine learning, conversation agents, chatbots, and social robots (Kelly et al.).

Unavoidably, new businesses, cutting-edge technologies, and evolving trends are appearing quickly in the existing markets. These data demonstrate how society's changing needs are about to change the way that practically all professional sectors arrange their traditional procedures, goods, and services. This article mainly focuses on the effects of digital disruption on the health professions, notably in the field of dietetics and nutrition, since it will introduce new means in most parts of assessment and counseling, offering a great deal of new potentials and possibilities. In these circumstances, it is essential to emphasize the correct usage of these digital tools and the amount to which their use adds value and does not supplant the fundamental values of the conventional ways. Hence, every professional should be aware of the need to integrate these technologies to keep up with social requirements and advances while maintaining the essential components that technology cannot replace and which are found in human experience and interaction (Mairi).

The importance of IPE (Interprofessional Education) in the medical environment and how it can enhance patient outcomes, satisfaction, safety, compliance, cost of treatment, and morbidity. The authors argue that more research and assessment of non-medical-based IPE are necessary because there is a dearth of published data specifically pertaining to interprofessional interactions amongst allied health professionals, such as nutrition and dietetics (N&D) and exercise physiology (EP). The burgeoning field of telemedicine, which has been recognized as a crucial method of healthcare delivery and might be needed for IPE training for graduates, is also explored by the writers (O'Shea et al.).

With the rise in smartphone ownership, diet, and nutrition applications (apps) have become more widely available. The effectiveness of these apps in treating patients with catabolism-prone illnesses and unique nutritional demands is still unknown, but they have the potential to improve nutritional outcomes. Nonetheless, the information that is currently available indicates strong acceptability and adherence, which must be viewed considering the related staff support offered within each trial. It is possible, simple to follow, and well received by participants to deliver food and nutrition therapies in catabolism-prone circumstances using digital technology (Cruz et al.).

A nutritionist and health professional's perspective on technological advancements is that they not only simplify important tasks but also enhance the quality of services. These modern technologies provide various opportunities to accomplish multiple challenging projects simultaneously, along with flexible approaches to nutritional assessment, evaluation, and counseling. Nevertheless, caution is advised, and further research is required as digital technology's potential to accelerate food system transformation for sustainable healthy diets has yet to be fully explored or comprehended. Additional data collection and sharing are urgently needed to tap into this potential (Graber).

Based on the research conducted by Chew et al. titled “Sustainability of Weight Loss Through Smartphone Apps: Systematic Review and Meta-analysis on Anthropometric, Metabolic, and Dietary Outcomes”, the topic of obesity and the difficulties associated with weight loss through behavioral changes are discussed. The three most common methods for managing weight are lifestyle modifications, medication, and surgery, with lifestyle modifications being the safest and most frequently utilized. Self-regulation techniques such as self-monitoring, goal setting, and relapse prevention have been proven to help with weight loss and maintenance. The effectiveness of smartphone apps on weight loss has been studied in multiple meta-analyses, but they have limitations and do not give a complete understanding of the effects of smartphone apps on weight loss, metabolic measures, and dietary outcomes. The authors intend to address this gap in the literature by exploring the effects of smartphone apps on these outcomes over time (Chew et al.).

More mobile devices, including smartphones, are available with nutrition apps. These can make the laborious task of recording intake for dietary assessment and self-monitoring easier. This enables individuals to manage their caloric intake, encourage their engagement in physical activity, and support a healthy lifestyle. There is still a dearth of research in this field on systematic analysis mapping investigations. This study aims to find mobile application deployment options for nutritional self-monitoring. The research on mobile applications for dietary self-monitoring identified seven groupings of overarching themes: body mass index, noncommunicable illnesses, techniques, nutrition algorithms, factors for disease detection, and mobile health applications. The study also examined yearly patterns in research. A mobile application that enables real-time meal recording, the convenience of automatically calculating the calorie content of consumed foods, and possibly improves the delivery of health behavior modification interventions to large populations of people is the focus of current research trends on dietary self-monitoring. By bibliometric analysis and network visualization, the researchers compiled the most current developments in nutritional self-monitoring research to highlight their research frontier, trends, and hot themes. These findings might be a useful source of direction for upcoming investigations and viewpoints in this quickly evolving area (Ulfa et al.).

The Well-D mobile app was developed to help individuals monitor and evaluate their dietary intake, and a study was conducted to test its effectiveness with 102 adults aged 18 or older who used the app for at least three days. Participants provided feedback on the app's features and offered suggestions for improvements. Such an app has the potential to encourage healthy habits among individuals and groups. However, dietary assessment and monitoring require complex processes that currently have inherent difficulties, such as reliance on memory, the need for specialized employees or literacy, coding requirements, food knowledge, and time-consuming tasks. Mobile technology has been proposed as a solution to these issues, offering personalized feedback and real-time assessment of dietary intake. While complete automation of diet analysis has not yet been achieved, researchers have explored the use of mobile technologies to measure and enhance dietary intake measurement (Ahn et al.).

Several applications used in the measurement of food consumption contribute to addressing these challenges. Also, these apps make the task of researchers easier and deliver more accurate data than conventional techniques. The drawbacks should be considered when creating the apps that will be used in the nutrition and dietetics fields. The assessment and monitoring of nutritional status as well as improved health are both anticipated benefits of artificial intelligence applications (Ülker and Ayyildiz).

Mobile health apps for dietitians offer on-demand support and tracking of lifestyle choices. Health care providers are now moving their focus from clinical consultations to online apps as a result of the mobile health trend. These apps typically charge more for advanced features while providing basic functions for free. There is a void in the literature that addresses why users want to use diet apps, despite the fact that diet apps are more widespread and have a larger user base presently. For seven years, the most popular online dietetics platform in Turkey, Diyetkolik, served as the researchers’ case study to better understand user behavior. (Akdur et al.)

Based on the research titled “Use of a Web-Based Dietary Assessment Tool (RiksmatenFlex) in Swedish Adolescents: Comparison and Validation Study” conducted by Lindroos Anna Karin et al., RiksmatenFlex, a web-based dietary assessment tool, was created for the Swedish national dietary survey of adolescents. Information on energy, fruit, vegetable, whole grain wheat, and rye intake is provided by the RiksmatenFlex and is comparable to intake discovered through recall interviews with Swedish adolescents. The findings are encouraging for future national dietary surveys and other studies in Sweden that will collect dietary data affordably. Future studies should concentrate on how and whether new technological innovations could lessen biases in dietary reporting (Lindroos et al.).

The goal of the computer science field known as artificial intelligence (AI) is to replicate human reasoning, learning, and knowledge management processes. It is striking how many applications there are in both clinical and experimental medicine. The use of artificial intelligence in the field of dietetics and nutrition is a relatively fresh and significant development. The use of many nutrition-related apps is available to users. The rise of artificial intelligence apps has also been prompted by the significance of personal nutrition. It is believed that various applications, including those that track nutritional intake and food preferences, can be crucial in promoting health. While assessing nutritional consumption, researchers may find it challenging to recall the frequency or quantity of eating (Ulker).

Based on research titled “Big Data: Big Data Analysis, Issues and Challenges and Technologies”, Big Data is the result of the exponential growth in data. This data is in a variety of structured, unstructured, and semi-structured data formats and has many different features. Depending on the needs of the many stakeholders, it provides valuable information that cannot be satisfied with the aid of conventional instruments and approaches. In order to handle, store, and interpret this enormous amount of data in real-time, big data technologies are essential. Big data analytics is used to draw actionable insights or patterns from massive amounts of data. It can be further broken down into four categories: social media analytics, text analytics, audio analytics, and video analytics. Data collection, storage, management, analytics, and visualization are all steps in the big data analysis process. But it is difficult and presents numerous problems that must be fixed. The big data concerns and challenges, significant big data traits, big data analytics, big data analysis procedure, and technology utilized to analyze the huge data are all covered in this essay. (Rawat and Yadav)

Today's enterprise-class data analytics platforms frequently include business intelligence dashboards, and for good reason. These features can be used by business users of all skill levels to have a better understanding of what is happening within their firm. By displaying metrics, graphs, gauges, maps, percentages, and comparisons of all the information that is coming into and out of the organization, dashboards make it simple for a business to view its data. This method of data viewing greatly reduces the learning curve and time to insight, enabling executives to take action more quickly. With the use of dashboards, IT can swiftly visualize and present complicated company data in a way that highlights key performance indicators. (KPIs). As a result, CEOs are given all the resources necessary to delve even farther into the study and uncover the truth. The need to sort through numerous reports has effectively been eliminated by dashboards, and in some circumstances, the data is updated almost instantly. Additionally, users have the option to suit each dashboard specifically with predetermined parameters, allowing for even quicker data tracking (King).

Research conducted titled “Impact of training and integration of apps into dietetic practice on dietitians' app self-efficacy and patient satisfaction: a feasibility study”, explained that utilizing mobile health (mHealth) apps in dietetic practice may help with the provision of nutrition therapy for medical conditions. However, dietitians rarely use apps when providing patient treatment. The purpose of this study was to assess whether an intervention involving education, training, and app integration could increase dietitians' perceptions of their own self-efficacy in utilizing mHealth apps. Methods For the intervention, accredited practicing dietitians in private practice who did not frequently use or suggest mHealth apps were enlisted. The intervention was divided into two phases: (1) a workshop that targeted self-efficacy, capability, opportunity, and motivation factors through educational lectures and skill-building activities; and (2) a 12-week intervention phase that allowed for the integration of an app into dietetic practice through an app platform. Dietitians gave new (intervention) patients receiving nutrition treatment a prescription for an Australian commercial nutrition app throughout the 12-week intervention phase. To gauge patient satisfaction prior to the introduction of the applications, existing (control) patients were also enlisted. At the conclusion of the 12-week period, new patients completed their patient satisfaction surveys. (Chen and Allman-Fernelli)

New methods of information sharing and dissemination are needed due to the quick expansion of food and nutrition knowledge. Information on food and nutrition has been described, tracked, and monitored using interactive platforms that integrate data portals with visualization dashboards. However, there is a lack of a thorough assessment of new interactive systems. Utilizing a set of 48 evaluation indicators for data integrity, completeness, granularity, visualization quality, and interactivity based on four main principles—evidence, efficiency, emphasis, and ethics—the researchers’ carried out a systematic review on publicly accessible dashboards. The researchers’ assessed 13 dashboards, listed their traits, benefits, and drawbacks, and offered recommendations for creating a nutrition dashboard. To summarize evaluation data corrected for inter-rater variability, the researchers’ used mixed effects models. The suggested metrics and evaluation guidelines support the expansion of information and knowledge sharing among researchers, practitioners, and decision-makers in the field of food and nutrition as well as the standardization and harmonization of data, dashboard performance, and usability. They also help to improve data literacy and communication. (Zhou et al.)

The Internet has greatly influenced many aspects of life, including healthcare. Internet technologies have advanced telemedicine and telehealth, leading to the emergence of eHealth, which involves health, technology, and commerce. Wireless communication technologies, such as mobile telecommunications networks, WLAN, WPAN, and WSN, have significantly contributed to the development of telemedicine and eHealth. These advances in communications have also led to the emergence of mHealth, which is defined as "medical and public health practice supported by mobile devices." Despite the advancements, there is still a long way to go in defeating illness. WHO has identified various prevalent diseases, including IDA, hearing loss, migraine, low vision, asthma, diabetes mellitus, OA, and unipolar depressive disorder. While there are published articles on types of wireless connections and app evaluations, there is still a need for comprehensive evaluations of (mHealth) apps to address prevalent diseases. (Pérez et al.)

The United States is dealing with a significant issue of obesity, which has expensive long-term consequences. Researchers are searching for effective weight loss interventions that can be applied in outpatient settings, but these tend to be time-consuming and resource-intensive. As a result, primary care providers often avoid discussing weight loss with obese patients, and they rarely spend enough time counseling them. Mobile health is a growing field, with many health-related apps available to help individuals improve their health behaviors, including weight loss. However, few of these apps have undergone rigorous evaluation. The MyFitnessPal (MFP) app is a popular app for weight loss that incorporates elements of social cognitive theory. It has a high rating and a significant number of registered users. This study aims to assess the impact of providing the free MFP app to patients in their primary care clinic for weight loss. If the app proves effective, it could lead to cost savings by preventing long-term complications such as diabetes and cardiovascular events. To date, no studies have examined the effectiveness of prescribing an app for weight loss to patients in a clinical setting. (Laing et al.)

TECHNICAL BACKGROUND

The researchers obtained detailed information from the CONAHS department about how Nutrition and Dietetics students conduct their client assessments. To consider the technologies that will be used in the web-based and mobile application, the researchers started a discussion of ideas. The technology, tools, and software that can be used in the suggested application were found by the researchers.

The research project is an IT-related study. These are some of the tools and technical terms used by the researchers in the projectand utilized by the researchers in the project: Web-based application, mobile application, HTML, CSS, Javascript, Bootstrap, PHP, Visual Studio Code, React Native, XAMPP, MySQL, Database, PHPMyAdmin, and Diagrams.net.

Web-based application are applications that runs in the web with the use of different browsers. In this project the course facilitator will use the web-based application for evaluating their students. Mobile application will be used by the students, they can perform the computation of anthropometric measurements and generate meal plan for their client using the mobile application. The researchers used React Native as IDE for building the mobile application.

“Hypertext Markup Language” is what HTML stands for. It is a type of markup language commonly used to build websites. HTML elements, which are denoted by tags with angle brackets, are the building blocks of HTML pages. A web page's structure and content are described by HTML tags. The ability to use hyperlinks to construct linkages between web pages is one of HTML's most significant capabilities. Clickable connections known as hyperlinks enable visitors to move between online pages. The <a> element, short for anchor tag, can be used to generate hyperlinks. The URL of the page to which the link points is specified by the href property (simplilearn.com).

The language known as Cascading Style Sheets, or CSS, was written on plain text using a text editor that will be used with the project's HTML content. By changing properties like adding colors, using various font styles, scaling things on the page, adding motion effects, adding responsive features, and other ornamental styles used in designing, it can define the layout of a webpage. The primary goal of CSS, according to academics, is to produce a style sheet to make an effective technique of designing the established web-based system, resulting in a more aesthetically pleasing user interface for the users (developer.mozilla.org).

JavaScript are high-level, interpreted programming language frequently employed to build interactive web pages and online apps. It is a client-side scripting language that works in the browser and may be applied to a variety of tasks, including handling events and modifying the Document Object Model (DOM) of a web page (w3schools.com).

PHP is an open-source language, anybody may use it and change it as they see fit. Also, it is cross-platform, which enables it to function on a variety of operating systems, including Windows, Linux, and macOS. Many built-in functions in PHP make it simple to carry out routine activities like working with texts, arrays, and databases(php.net).

XAMPP is a free and open-source cross-platform web server solution stack package developed by Apache Friends, consisting mainly of the Apache HTTP Server, MySQL database (actually MariaDB), PHP. It is used to set up a local web server environment on your computer for testing and development purposes(javatpoint.com).

THEORETICAL FRAMEWORK

Throughout the years, nutrition is crucial for the promotion of health as well as the prevention and treatment of disease. Although doctors and other healthcare professionals are required to advise patients on nutrition, current assessments show that medical nutrition education has made little to no progress. New and inventive technologies that quickly appear are a sign that people are entering a new era. Innovative technologies are becoming more pervasive throughout all facets of daily life, a phenomenon called “digital disruption."

In the research conducted by Gäbler, Gabriele et al. titled, “Integrating a New Dietetic Care Process in a Health Information System: A System and Process Analysis and Assessment”, the project's goal was to assess how the integration of standardized terminology and document templates for a dietetic care process (DCP) into a health information system (HIS) at an Austrian hospital could be analyzed. To achieve this, an action research approach was used, which involved four expert interviews to examine the DCP and two expert interviews with observations to evaluate the integration into the HIS.

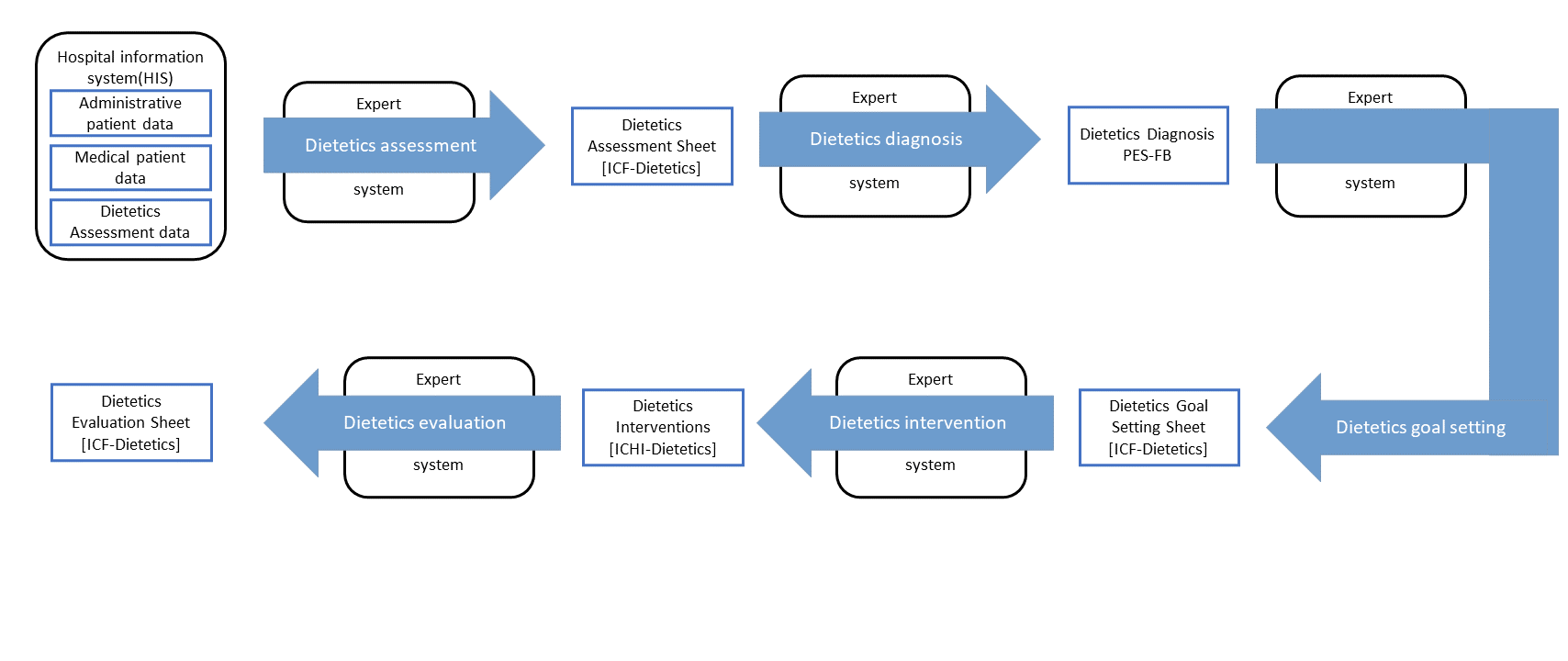


Figure 2.1: New DCP with document templates and standardized terminology use by Gäbler, Gabriele et al. (adapted from Krottenmüller)

Figure 2.1 discussed the study evaluated the main criteria, including the integration of the ICF catalogue, the adaptation of document templates, DCP adaptation, and user authorization adaptation, presenting their strengths and weaknesses. Additionally, proposals for improvement were offered. The study discovered that the DCP's system and process integration is achievable, and the document templates can be adjusted using the present software. While there may be an initial increase in resources and finances, combining standardized dietetic terminology with a standardized process is likely to boost care quality and support outcomes management and research (Gäbler, Gabriele et al.).

Although the integration of technology into assessing clients can be effective, older dieticians may not readily adopt new technology compared to younger generations who are more responsive to modern technology. Despite this, it is important to emphasize the potential benefits of integrating technology in nutrition assessment while recognizing the value of traditional methods.

CONCEPTUAL FRAMEWORK

The conceptual framework below presents the method used in this study to get its intended output using IPO (input, process, and output).

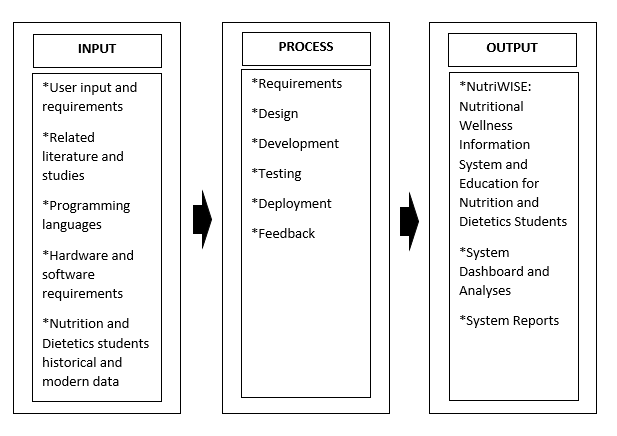
Figure 2.2 Research Paradigm on the NutriWISE: Nutritional Wellness Information System and Education for Nutrition and Dietetics Students

Figure 2.2 describes the conceptual framework of the Cross-Platform Nutrition and Dietetics Course Management System in the Batangas State University-ARASOF CONAHS Department. It shows the flow of the required processes to achieve the desired output of the developed system. Once finished, it aims to replace the legacy method of manual assessment of the Nutrition and Dietetics students in the campus.

For input, it consists of the user's information, related studies, programming of the front and back-end, hardware and software needed to conduct the system, and the data to be provided by the students/clients. All the needed input data are stated here.

For the process, Requirements, Design, Development, Testing, Deployment, and Review are included. This includes every process that the data will go through to achieve the desired results and recommendations of the developed system.

For the output, this consists of the results based on the flow process of the study. The researcher’s developed recommendations that will aid the Batangas State University-ARASOF Nasugbu Campus, Nutrition and Dietetics students to improve upon their manual assessments and ease the process of collecting data from their respective clients and furtherly compute and develop the assessments using computerized estimations. This will help them to provide their client the best meal plan and as fast as possible.

SYNTHESIS

The discussed ideas in the related literature from various studies conducted locally and internationally are pertinent to the present project, as they provide the information for creating a web-based application and mobile application. The application will be having an analytical tool and will be used by the students and course facilitator for improving the quality of education.

Upton’s take on the courseware application in the field of nutrition and dietetics education helped the researchers evaluate student perceptions of the online content and measure their academic achievements when exposed to this novel teaching method. This would primarily help on what features could help students adapt to individual and online learning.

The concept of Well-D, a mobile dietary self-monitoring application that is developed by Ahn et al., is like the developed application in terms of tracking the dietary intake of the client. The application also has the capability of tracking how the client is taking care of their health. The developed system is going to manage and keep the records of the clients and can be retrieved in the next assessment.

The study that was conducted by Chew et al., helped the researcher’s study to analyze how the developed application can help the clients that is obese to lose their weight or the underweight to boost their weight. This study proved that mobile applications could help the client to sustain, lose or gain weight by just following the recommendation of the application.

Based on the conducted study of Ülker and Ayyildiz, artificial intelligence has a huge effect in the nutrition and dietetics field. They play a good role in making sure that the user is improving their health based on the advice and recommendation of the application or the system that is powered by AI. This study helps the researcher to identify the needs in technology in terms of nutrition and dietetics. They analyze how artificial intelligence can help the students for faster generating of meal plans.

The concept of RiksmatenFlex that is developed and studied by Lindroos et al., is similar to the researcher’s project, it is how the clients will take the vegetables, fruits and etc. in the whole day, the researcher’s application will integrate that kind of approach on which the students will decide how many foods exchange does the clients will take in a day and what kind of food they eat.

King’s notion on data analytics fits in nicely with how the researchers would want to integrate creating a dashboard for a more effective summary of reports. Dashboards make it simple for a business to view its data by providing metrics, graphs, gauges, maps, percentages, and comparisons of all the information that is coming into and leaving the organization. Executives can act more rapidly thanks to this type of data viewing's considerably reduced learning curve and speed to insight. IT can quickly view and present complex corporate data using dashboards in a way that emphasizes critical performance indicators. By the use of data visualization or dashboarding, the researchers can also integrate this kind of module for the course facilitator to manage and view their students’ performance.

The conducted study of Pérez et al., gives a notion to the development of technology and its role in the current state of health. Healthcare has been significantly impacted by the internet, telemedicine and telehealth have advanced thanks to internet technologies, and eHealth, which combines health, technology, and commerce, has emerged as a result. Telemedicine and eHealth have greatly benefited from the development of wireless communication technologies like mobile telecommunications networks. This kind of health monitoring can be implemented in the researcher’s proposed system and will greatly benefit the students and their clients.

**CHAPTER III**

**DESIGN AND METHODOLOGY**

This chapter discussed the methodology of the research showing all the processes and information that have representation of diagrams, figures, and requirements for the development of the system.

Research Design and Methods Used

To fulfill the study's goals and objectives, the researchers used a descriptive technique. With this method, information was gathered, and the research materials were understood to answer queries about the investigations' current state. The researchers will calculate averages, frequencies, and other statistical statistics using the descriptive approach.

This chapter also covered the research methods and procedures that would be useful in the analysis of the proposed system, information system for nutrition and dietetics students from Batangas State University-ARASOF Nasugbu campus. By employing an agile development method, the researchers will be able to stay focused and organize throughout the entire development process. This involves breaking down the overall project into smaller, more manageable phases, each of which could be tackled one at a time. This will help to ensure that progress was made consistently, without becoming overwhelmed by the complexity of the project.



Fig. 3.1. Agile Methodology

Source: https://targettrend.com/agile-methodology-meaning-advantages-disadvantages-more/

Figure 3.1 shows the following phases and processes of the agile development methodology to complete the project. It includes the requirements, design, development, testing, deployment, and review.

Requirements

The researchers conduct brainstorming meetings throughout this stage to find issues that may be solved by creating a system. To learn more about the workings of the BS Nutrition and Dietetics program, they also spoke with a course facilitator from that program. To ascertain the system needs, they also acquired data from the institution throughout this phase.

Design

To develop the system, the researchers produced a variety of outputs during this phase, including flowcharts, schematics, and prototypes. A CSS framework is used to create a basic framework for the system design, combining grids and interactive user interface patterns. The system was meant to be user-friendly.

Development

During this stage, computer programming languages will be used to start developing the back end of the project. Using code composition and coding abilities, this step necessitates a lot of trial and error to accomplish the needed functions.

Testing

The system was thoroughly examined at this point to make sure all its functions will perform as intended. Prior to the deployment phase, any potential problems or inconsistencies that can be found and will fix to guarantee system quality.

Deployment

The system will be launched at this time, enabling users to access and use the appointment system. Also, the researchers will gather user comments that they can utilize to improve the system in the future.

Review

This phase, which served as the agile methodology's last stage, will evaluate the system's suitability for the users for whom it was designed. Also, it entailed gathering suggestions and helpful criticism from user input to improve the operation of the system.

DEVELOPMENT PROCESS

The development process of the proposed system incorporates testing, debugging, and validation approaches. Each approach was crucial for the development and improvement of the advancement of the developed application.

Testing

The researchers have conducted a procedure called Test Case, which is a group-by-group testing, wherein other groups will test the listed functionalities of their system, be it a single web application, or a cross platform that includes a mobile and web application. The said functionalities are listed in a spreadsheet, that includes a step-by-step process of every known functionality their respective system possess. Each process has a scenario, pre and post condition, expected result and its actual result. Each process will be graded accordingly whether it failed or passed the testing.

Debugging

The researchers will also rely on the Test Case procedure for the debugging process. If the listed functionalities have passed the initial testing stage, then it can be continued to improve upon it. But if a certain process failed to meet the conditions and give unintended results, then the debugging process comes in, where the researcher/developers will debug the program to make the failed process work and be tested again.

Validation

To validate the application, there are various actions that must be taken in order to validate an application. To begin with, you must specify the criteria for validation, which should include the application's goal, target market, and expected functionality. The following stage after identifying the validation criteria is planning and getting ready for validation by choosing validation techniques, tools, and resources. Following completion of the planning phase, you can carry out functional testing to make sure the application complies with the functional specifications listed in the design document. The program is then put through integration testing to make sure all its parts function as intended. After that, user acceptance testing is carried out to get feedback from end users and determine whether the application fulfills their needs and expectations.

PROGRAMMING PROCEDURE

A diagram of a computer network

Description automatically generatedSystem Architecture

Figure 3.2 System Architecture of the System

Figure 3.2 represents the system architecture integrated in the system, which aids the researchers in defining the framework setup and added view of the proposed system. Using their allocated accounts, students can perform their tasks given by the course facilitator; they can also generate meal plans based on their given anthropometric measurements; the course facilitators themselves can add classes and students in which they can also base their task allocation to the students. They can also check the finished tasks by the students. The client’s application can view the result of the generated meal plan created by the students.

Requirements Analysis

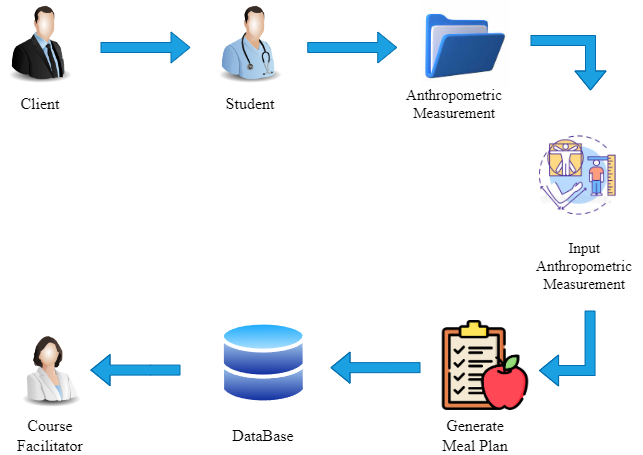


Figure 3.3 Requirements Analysis of the System

In this figure 3.3, shows the requirements analysis, which will assist the developers in determining the user’s expectation for the proposed system. It shows the client of the students in which the client will be measured his anthropometric measurements. The students will input that data into the proposed system, and it will calculate the anthropometric measurements and eventually generate a meal plan for the client. This generated meal plan will be saved in the database including the name of the client and the students that assess to the client. After that, the course facilitator can view the generated meal plan.

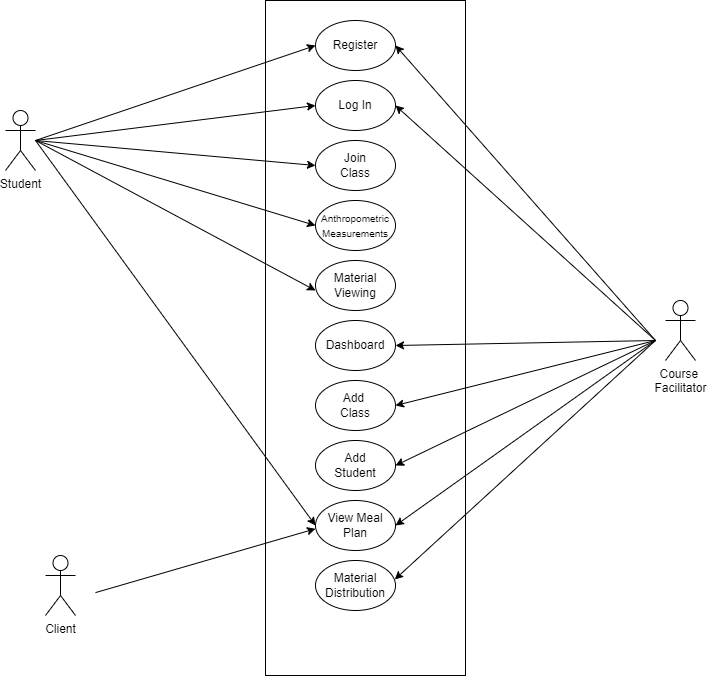
Use Case Diagram

Figure 3.4 Use Case Diagram of the System

Figure 3.4 shows the user’s interaction with the system. The information system for nutrition and dietetics students had three actors: Students, Course Facilitator, and Client. The students and course facilitator can register and login into the system, while clients themselves have a separate application for viewing their respective meal plan. The students collect the anthropometric measurements of the clients, and they can generate a meal plan. The students can also join a class, view the materials the course facilitator gave them. The course facilitator will be having a dashboard, can create class, add students to the class, and distribute course materials to the students. All three actors can view the generated meal plan.

A diagram of a company

Description automatically generatedContext Diagram

Figure 3.5 Context Diagram of the System

In the figure 3.5, the context diagram shows the interactions among three entities - the student, the course facilitator, and the client. It is inside the rectangular box; they are connected to the NutriWISE system that’s represented by a square in the center. The flow of data or information among the entities and the NutriWISE system is depicted in the diagram by the arrows.

Data Flow Diagram

A diagram of a student

Description automatically generatedFigure 3.6 Data Flow Diagram of the System

Figure 3.6 illustrates the Data Flow Diagram information running around the system, which narrates the process of how the input and output data moves through the application. The data flow diagram represents all the entities in the system which includes the course facilitator, student, client, and the several processes that progress through the cycle.

Entity-Relationship Diagram

Diagram

Description automatically generated

Figure 3.7 Entity Relationship Diagram of the System

In Figure 3.7, the required table, attributes of each table, and the interconnections between them, along with the database's structure for the developed system, are demonstrated. This diagram is an entity relationship model that visually represents the relationships between the entities.

HARDWARE AND SOFTWARE NEEDED IN THE DEVELOPMENT

Hardware Needed

The hardware requirements for the web system and mobile application will contribute to successful designing and programming the proposed system.

Table 3.1

Hardware Needed of the Laptop for the Development

|  |  |  |
| --- | --- | --- |
| **Hardware** | **Specification** | **Function** |
| Random Access Memory (RAM) | 4GB of RAM | RAM is used to store, read, and write any type of data. |
| Processor | 2.10 GHz | It is a computer component that processes data. |
| Monitor | 1920x1080 | Monitor is a piece of computer hardware that displays the video and graphics information generated by the computer. |
| Mouse | USB Mouse | A computer mouse is a hand-held pointing device that detects two-dimensional motion relative to a surface. |
| Keyboard | USB Keyboard | A keyboard is one of the primary input devices used with a computer. |

Table 3.1. Shows the suggested hardware of a laptop to develop the system. The indicated hardware requirements such as Random-Access Memory (RAM), Processor, Monitor, Mouse, and Keyboard are important to accomplish the project. This hardware requirements helped develop the proposed system of the researchers.

Table 3.2

Hardware Needed of the Mobile Device for the Development

|  |  |  |
| --- | --- | --- |
| **Hardware** | **Specification** | **Function** |
| Random Access Memory (RAM) | 2GB of RAM | RAM is used to store, read, and write any type of data |
| Processor | 1.8 GHz | Mobile components that process data. |
| Mobile Device | 720x1280 | Mobile devices have a flat LCD or OLED screen, a touchscreen interface. |
| Memory Card | 2GB | Small storage medium, which is generally used to store information. |

Table 3.2. shows the suggested hardware for a mobile device to develop the mobile application. The indicated the minimum hardware requirements such as Random-Access Memory (RAM), Processor, Mobile Device and Memory Card are important to accomplish the project. This helped the developer create a mobile application that fits to all mobile devices.

Software Needed

The software requirements for the web system and mobile application contributed to successful designing and programming the proposed system.

Table 3.3

Software Needed in the Development

|  |  |  |
| --- | --- | --- |
| **Software** | **Specification** | **Function** |
| Programming Language | PHP | PHP enables writing a simple message on the browser when the scripts are run. |
| Programming Language | Javascript | Javascript enables writing a script that can give functionality to the web application. |
| Integrated Development Environment | Visual Studio Code | VS Code is an IDE for text editor for editing local files. |
| Integrated Development Environment | React Native | React Native is an IDE primarily for building an Android application. |
| Database | MySQL | MySQL can be used in adding, removing, and modifying information in the database. |
| Web Server | XAMPP | A free and open-source cross-platform web server solution stack package that allows the researchers to run the developed system in a localhost. |

Table 3.3 shows the software requirements in the proposed NutriWISE: Nutritional Wellness Information System and Education for Nutrition and Dietetics Students to achieve good compatibility and functionality.

PHP and Javascript are programming language used by the researchers to write code for web application and debug in the IDE, Visual Studio Code that is developed by Microsoft that can be an IDE for any other programming languages. For developing the mobile application, the researchers used the React Native IDE, that is primarily used for android development.

NutriWISE application used an online database to store its data using MySQL. It includes a free MySQL database, phpMyAdmin, with secure, reliable, and fast hosting.

Lastly, the researchers used XAMPP as a development tool, allowing the developers to test their system on their own PCs without the need for internet access.

INSTRUMENTATION

The researchers used survey questionnaires for gathering data, and the main respondents are the BS Nutrition and Dietetics students of Batangas State University ARASOF Nasugbu Campus. The researchers will use methods in descriptive analytics to analyze the answers based on the Likert Scale (5 points). The feedback provided by them will play a role in improving and adding to the features and functions of the system. The capstone advisor will check the questionnaires to confirm that the questions were suitable for the system's needs.

PREPARATION AND EVALUATION

Respondents will be given a survey form to fill out to provide input on their satisfaction with the functioning and acceptability of the system, which the researchers will use to prepare for assessing it. The objective was to enhance the system to better serve users’ demands. To gauge respondents' levels of acceptance and agreement/disagreement with the system, a Likert scale (with 5 points) will utilize. The responses of the respondents will be using the values given to each point on the scale.

 The researchers will use the scaled of 1 to 5, with 5 being the highest value and 1 being the lowest value.

Likert Scale =   
  
i = interval

h = highest value in the questionnaires

l = lowest value in the questionnaires

t = total number of preset options in the

questionnaires

Table 3.4

Guideline Interval for Level of Satisfaction

|  |  |  |
| --- | --- | --- |
| **Scale** | **Mean Range** | **Descriptive Equivalent** |
| 5 | 4.21-5.00 | Highly Satisfied |
| 4 | 3.41-4.20 | Moderately Satisfied |
| 3 | 2.61-3.40 | Satisfied |
| 2 | 1.81-2.60 | Slightly Satisfied |
| 1 | 1.00-1.80 | Not Satisfied |

Table 3.4 shows the scale will be use in the evaluation. It had the appropriate mean range descriptive equivalent. Through this, the level of satisfaction of the respondents will determine. The researchers will use descriptive statistics to write a brief numerical or visual summary of the information gathered when analyzing Likert Scale data.

Sample Size Determination

The participants of the study include the BSND students and course facilitators of Batangas State University ARASOF Nasugbu Campus. Thirty-three (33) respondents composed of thirty-one (31) BSND students and two (2) course facilitators participated in the study. They will be ask to utilize and evaluate the developed system.

Sampling Procedure

The sampling method used was convenience sampling for probability sampling. The researchers used convenience sampling in this study to get an idea of the perspective of enumerators, BSND students and course facilitators on the developed system was the: Nutritional Wellness Information System and Education for Nutrition and Dietetics Students of Batangas State University ARASOF Nasugbu Campus.

Participants of the Study

The participants of the study include the BSND students and course facilitators of Batangas State University ARASOF Nasugbu Campus. Thirty-three (33) respondents composed of thirty-one (31) BSND students and two (2) course facilitators participated in the study. They were asked to utilize and evaluate the developed system.

Table 3.5

Participants of the Study

|  |  |
| --- | --- |
| **Respondents** | **Number** |
| BSND Students | 31 |
| Course Facilitators | 2 |
| Professional Nutritionist | 1 |
| **Total:** | 34 |

Table 3.5 shows the distribution of study participants, who are the BSND students, and course facilitator of Batangas State University ARASOF Nasugbu Campus.