

## Development of a Web-Based Related Learning Experience for Nursing Students in an Open University

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**Abstract:** When the COVID-19 pandemic began, everyone had to alter their everyday routines. With the introduction of online education, it became difficult for nursing educators to offer specific lectures that required physical demonstration or to test clinical abilities. Since health workers were also in demand, there were few clinical preceptors to guide nursing students to improve their abilities. This study focused on developing a web-based related learning experience that will give students alternative activities for clinical learning experiences without the use of Computer-Generated Imaging and provide a useful platform where they will see a 360 view of different clinical setups and simulations. The researchers employed an ongoing quasi-experimental research design following the Successive Approximations Model (SAM) as a framework. The team developed the prototype currently being implemented and monitored the online platform this coming second semester school year 2022-2023. The researchers plan to share the developed virtual reality with other academic departments that require on-the-job training or on-site exposure for skills enhancement in the future.

**Keywords:** E-Learning, Web-based Related Learning Experience, Nursing Education, Successive Approximations Model

## INTRODUCTION

During the move from traditional face-to-face classrooms to online instruction, nursing educators struggled to find ways to transfer knowledge to their students, particularly in giving critical clinical experience. Students' clinical practicum is an important aspect of nursing education and is commonly referred to as Related Learning Experiences (RLE). RLE is unique to the nursing discipline like other health-related professions because it applies theories, knowledge, and learning acquired during classroom discussions and establishes nursing students' healthcare skills under the direct supervision of professional clinical instructors and nurses (Ramel & Martin, 2018).

The suspension of classes due to the pandemic has presented students, educators, and administrators with a multitude of extraordinary challenges. According to UNESCO statistics (Unicef et al., 2020), the closure of schools and higher education institutions on April 1, 2020, affected 185 countries and 1.5 billion students. A few weeks after the lockdown, the Commission on Higher Education (Joaquin et al., 2020) issued an advisory allowing HEIs to deploy available flexible learning and alternative modes of delivery. The goal of these memorandums was to encourage students to continue learning despite the ongoing pandemic. According to an article by Joaquin et al. (2020), even with the innovations made by Philippine HEIs for modified online learning and modes of delivery, there are still challenges and concerns.

The Focused Group Discussion conducted during the initial phase noted that finding a learning material was one of the many challenges that these educators have experienced. They have to think of alternative ways to deliver their learning objectives at the same time improvised materials that are patterned to their manuals. Preparing these materials was difficult for them because of different factors such as lack of time and funding.

Connectivity was also a problem during the transition. The Philippines' average internet speed is much slower compared to other neighboring countries. Educators were also emotionally and mentally drained because of the sudden transition to online learning. The purpose of the study is to develop a web-based RLE design that provides students with an alternative activity for clinical learning experiences without the use of Computer-Generated Imaging and a useful platform where they can see a 360-degree view of various clinical setups and simulations.

## Theoretical Framework

Michael W. Allen's Successive Approximations Model (SAM) serves as the conceptual framework for the study's development phase (Wintarti et al., 2019). This model employs rapid prototyping as its methodology and is considered an alternative to more conventional models such as ADDIE (Jung et al., 2019). The project, like SAM, is also divided into phases. Needs were assessed during the Preparation Phase, and program scripts and other product requirements were created. Videos, system design, and the platform for the web-based RLE were planned and developed during the Iterative Design Phase. The project is currently in its Iterative Development Phase, with MAN program faculty members implementing the prototype in their classes. Evaluation shall be done after the semester.

## METHODOLOGY

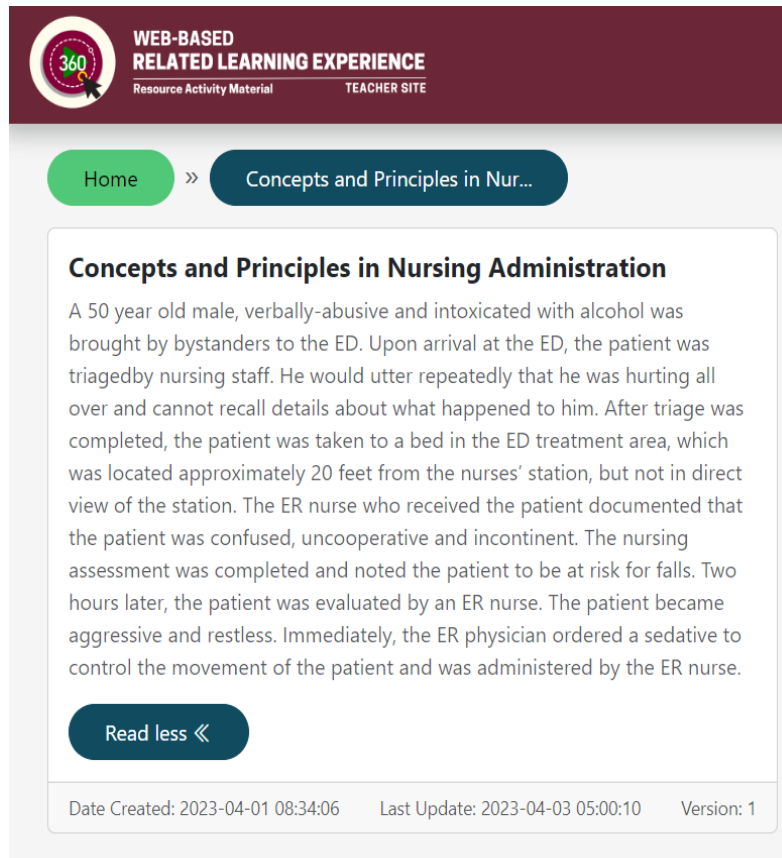
This study employed a quasi-experimental research design to develop the web-based RLE. Quasi-experimental designs are often conducted to see if an intervention is effective (de Vocht et al., 2021). The researchers explored the challenges that the nursing educators experienced through a Focused Group Discussion and used it as the basis for the development of RLE for implementation to nursing students initially to identify the features that should be highlighted for the project. The participants during the needs assessment were faculty members from the Master of Arts in Nursing Program in an Open University who experienced the transition during the pandemic (AY 2020-2022).

After developing the web-based Related Learning Experience, all students enrolled in and faculty members handling 11 courses during the Second Semester of 2022-2023 were invited to test the RLE prototype web-based design. The students are registered nurses with at least one year of clinical experience; thus they are all aware of the actual scenarios. Students and teachers will then be asked to evaluate the product. This study received ethical approval (REC code: 2022-0002-F-FMDS).

## RESULTS

### Web-based RLE Design as Resource Activity Material

The first phase included a needs assessment where the Faculty Members of the Master of Arts in Nursing (MAN) evaluated and critiqued the existing academic solutions implemented in the first semester of Academic Year 2020-2022 to address the concerns. The workshop included Open University MAN consultants and IT experts. The participants developed case studies for all major subjects of each specialty (Adult Health Nursing, Maternal and Child Nursing, Gerontology and Geriatric Nursing, and Nursing Administration). Templates for writing the simulation's program scripts were prepared to standardize the process. The case study template contains the title, focus area, scenario description, scenario objectives, setting, required equipment, and scenario implementation. While case studies for each specialty were identified, the scripts were written in subsequent online meetings via Zoom. The authors also identified team members such as the director, editor, graphic designer, and actors. Figure 1 shows an example of a case scenario made by the consultants.



The screenshot displays a web-based RLE design interface. At the top, there is a dark red header with a circular logo on the left containing the number '360' and a magnifying glass icon. To the right of the logo, the text reads 'WEB-BASED RELATED LEARNING EXPERIENCE' in white, with 'Resource Activity Material' and 'TEACHER SITE' in smaller text below it. Below the header is a navigation bar with a green 'Home' button and a dark blue button labeled 'Concepts and Principles in Nur...'. The main content area features a white box with a dark blue title 'Concepts and Principles in Nursing Administration'. The text describes a case scenario: 'A 50 year old male, verbally-abusive and intoxicated with alcohol was brought by bystanders to the ED. Upon arrival at the ED, the patient was triaged by nursing staff. He would utter repeatedly that he was hurting all over and cannot recall details about what happened to him. After triage was completed, the patient was taken to a bed in the ED treatment area, which was located approximately 20 feet from the nurses' station, but not in direct view of the station. The ER nurse who received the patient documented that the patient was confused, uncooperative and incontinent. The nursing assessment was completed and noted the patient to be at risk for falls. Two hours later, the patient was evaluated by an ER nurse. The patient became aggressive and restless. Immediately, the ER physician ordered a sedative to control the movement of the patient and was administered by the ER nurse.' Below the text is a dark blue button labeled 'Read less <<'. At the bottom of the white box, there is a footer with the text: 'Date Created: 2023-04-01 08:34:06 Last Update: 2023-04-03 05:00:10 Version: 1'.

There was a series of pre-conference meetings wherein Nursing Experts advised on-scene execution. A Memorandum of Agreement was arranged with a tertiary hospital wherein the scenes will be filmed. Several rehearsals, testing of equipment, and orientation were done before the filming started. The filming of each case scenario took place in different areas at a tertiary hospital to capture various real-life settings in all nursing tracks. Sample images that were taken at the hospital are shown in Figure 2. This effectively portrayed an opportunity to enhance higher-order thinking and clinical skills enhancement needed for the courses. The team developed a total of 16 courses for the program but only implemented 11 subjects for the current semester. There were a total of 15, 16,

20, and 35 scenarios for the nursing tracks 1-4 respectively. Case scenarios included real-life situations that are commonly encountered by nurses at the hospital that would test their clinical prowess. This will help assess their knowledge and clinical and decision-making skills.

Using a camera that captures the 360 view, the videos allow users of the web-based RLE design to navigate through the environment digitally giving them a sense of reality. For this project, the 360° camera model that was used to shoot various clinical setups is Insta360 One X2. Also, the team used a Canon Powershot G7 X Mark II digital camera for video scenes that do not require a 360-degree view. Before the pre-conference and final video shoot phase, the IT team tried out the 360° camera to know how it works since the blocking of positions is different from a non-360 video. It was noted that there are blind spots in a 360 setup which are located perpendicular to the line of sight of the camera which is a result of stitching two videos taken by two lenses.

Thus, these spots were taken note of so that the important elements of a scene will not be distorted and improve user experience. Also, during the video shoot involving clinical skill implementation, the one that is wearing the improvised tripod must ensure that the arms must protrude for it to be seen in the video. It was observed that the props that will be used must be seen since the top of the head is also caught in the video. It was noted that even if the actor's POV head moves horizontally or vertically, the video taken is still stable since the 360° camera has a stabilization feature. These observations from the test shoots will help the actors and team for the pre-conference/preparation of the video shoot.

The IT team edited and rendered the simulation videos from the final shootings before uploading them to the YouTube channel. Screenshots of the 360 videos uploaded to the channel are shown in Figure 2. This decision was made after careful consideration of several factors, such as website performance, buffer time, loading speed, bandwidth capacity, and hardware performance. After exploring various open-source video players, including video.js, Playr, and Clappr, the team concluded that YouTube was the best option for handling 360 videos. Although YouTube is not an open-source video player, it offers a public API that developers can leverage to create customized applications and integrations with the platform. This feature makes YouTube an attractive choice for developers who want to incorporate 360 videos into their projects while retaining control over the user experience.

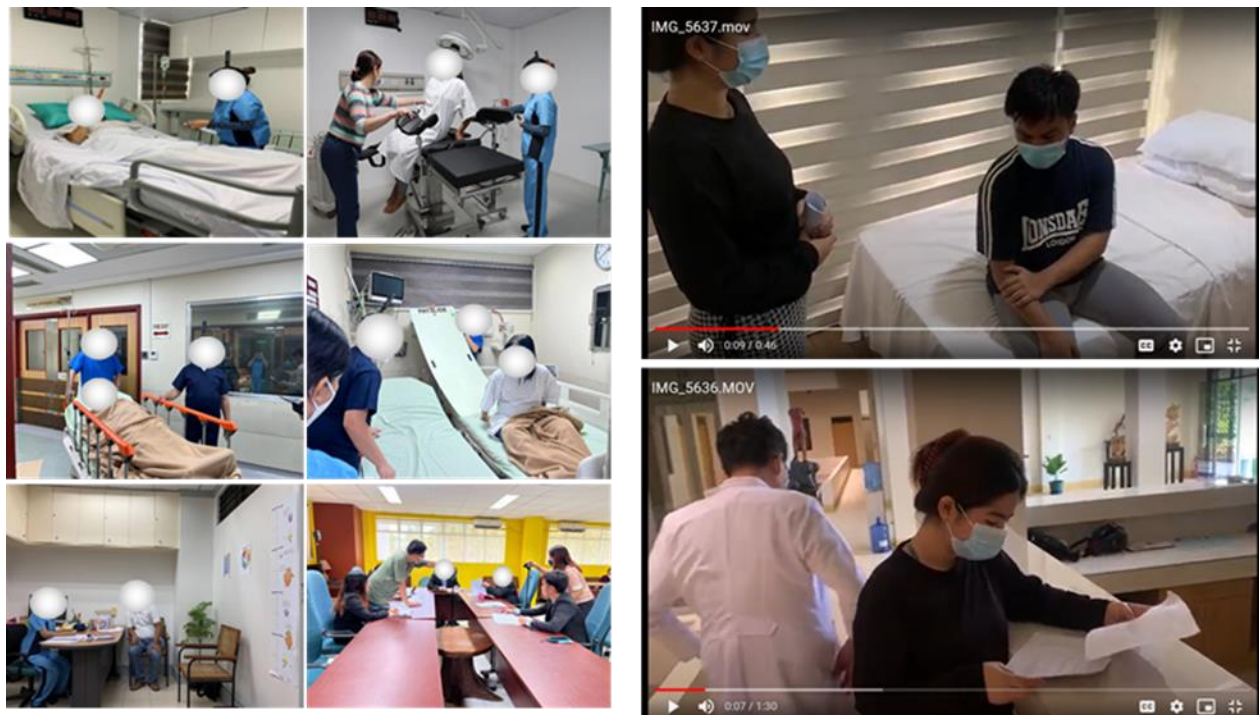


Figure 2. Example of images of 360 videos developed in this study

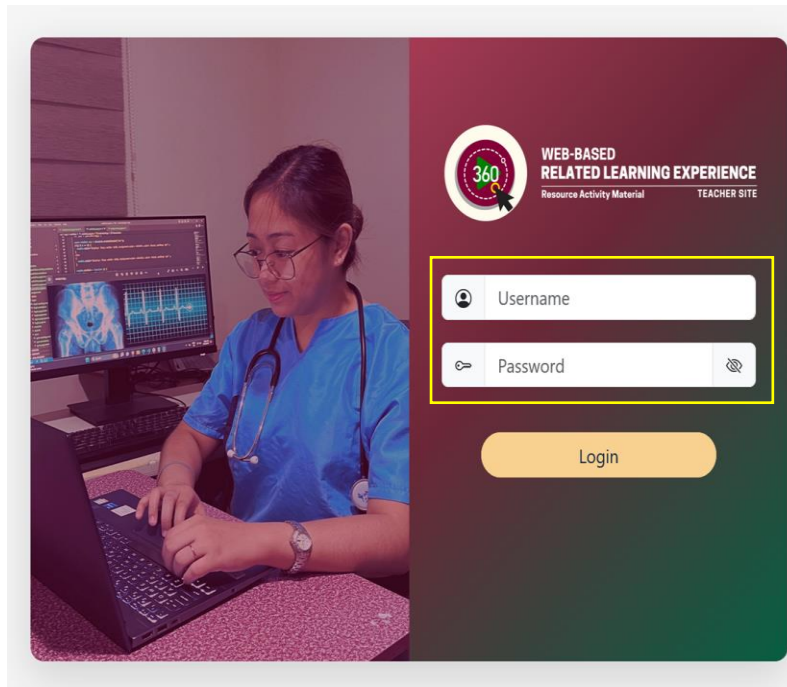


Figure 3. Login Page

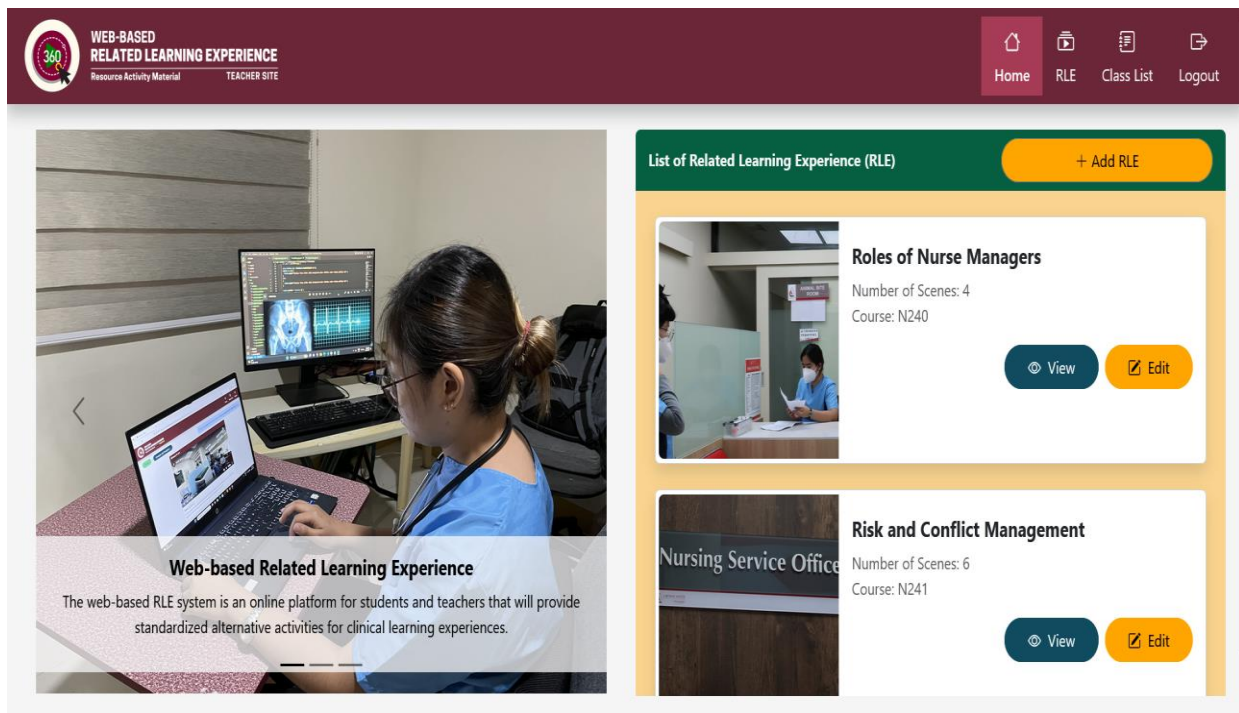


Figure 4. Home page of the Project Website

The IT team designed the web-based RLE that caters to teachers and students separately. Teachers can give access to students, and navigate class lists, study descriptions, supplementary files, and links. Figure 3 shows the login page of the teacher site of the developed platform. Subjects that the teachers will teach for the semester can be seen on the homepage. A screenshot of the homepage of the teacher site is shown in Figure 4. Teachers can upload and edit videos, video thumbnails, and questions on every video scene. The scene list where they can perform these functions is shown in Figure 5. On the other hand, students can view and review videos and answer questions for all courses they are enrolled in.

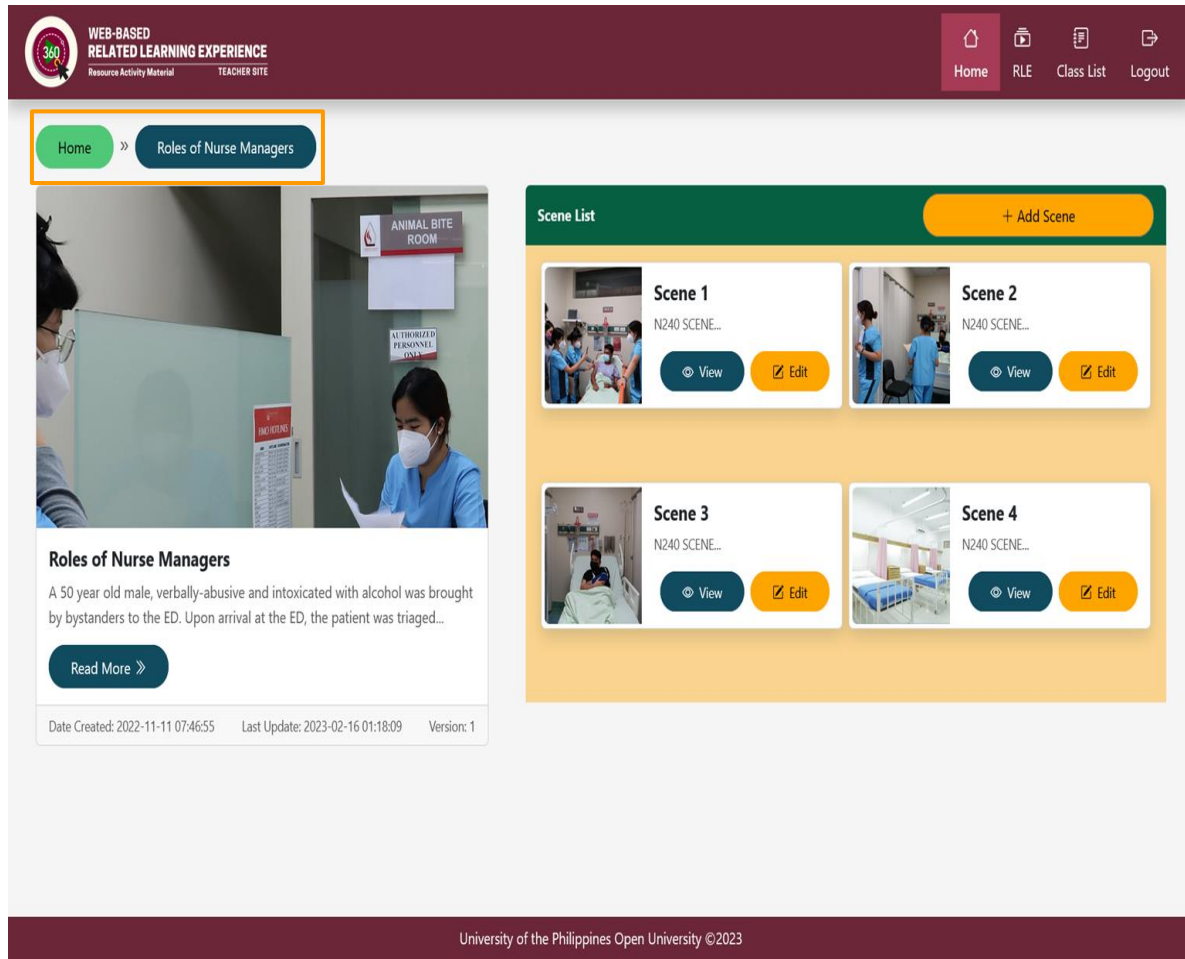


Figure 5. Scenes

GoDaddy Inc. is used for registering the domain and hosting the site for implementation so that users can access the website. GoDaddy Inc. also handles the web hosting for the website. HTML (Hypertext Markup Language) is a language that was used by the team to build websites by creating the structure and contents. Javascript was used to build features that allow users to interact with a website, such as rerouting them to different pages when they click on a button.

The design and layout of the website are handled by CSS (Cascading Style Sheets) and Bootstrap, which is a CSS framework that is being utilized in order to further improve the site such as styling and formatting web pages. PHP (Hypertext Preprocessor) was used for server-side validation and database access, as well as for creating server-side scripts that generate dynamic web content. Lastly, the team used MySQL (My Structured Query Language) for

database management and querying relational databases. The following web tools were also utilized for code editing Visual Studio Code, DreamWeaver, Notepad, Notepad++, SQLyog, and HeidiSQL Browser; for developing Firefox, and Microsoft Edge; graphic designing Adobe Photoshop, Microsoft Paint, Adobe Fireworks; and video editing Adobe Premiere Pro, Adobe Media Encoder. Figure 6 shows the web architecture used by the IT developers in creating the interface of the online platform.

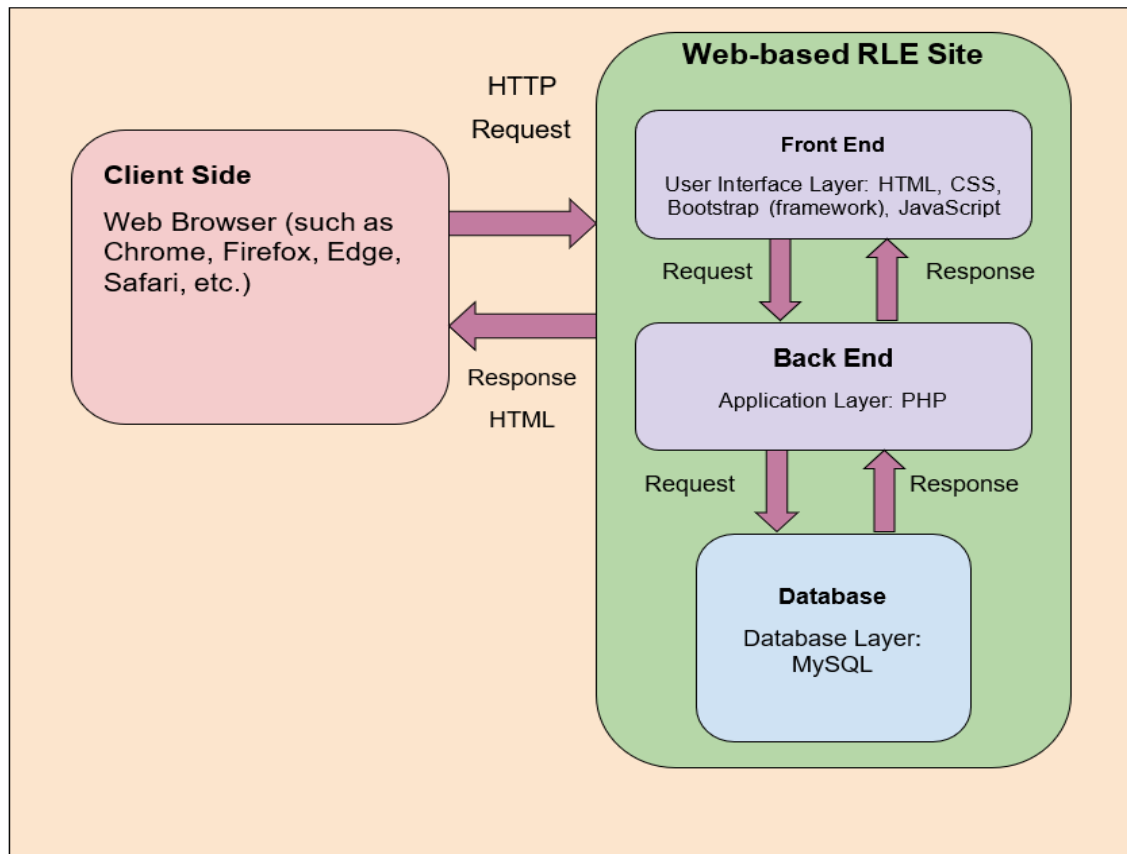


Figure 6. Web Architecture of the development of Web-based RLE

## DISCUSSION

It is highly beneficial that the students and teachers participating in the study have prior experience with online and remote learning. Since the team decided to conduct the video in a hospital setting, it promotes learning in the actual environment. This could reduce the probability of errors in their actual performance (Koukourikos et al., 2021). According to Ryall et al. (2016), student performance may be examined through step-by-step acquisition of clinical skills that also allows for repetition; here is where the web-based RLE design becomes beneficial. Another advantage is allowing students to learn practical knowledge without exposing patients to any risks. As a result of the web-based RLE design's incorporation of real-world contexts, learners can complete the learning process by reflecting on their performance (Lavoie and Clarke, 2017).

The limitations of the study include the fact that the primary focus was on creating a web-based RLE based on hospital settings. It is important to acknowledge that nurses can play a role in different settings such as clinics and communities. It was also noted that most, if not all of the related learning activities highlight patient care only. The researchers acknowledge the need to also include other roles such as teaching and research which are basic competencies needed for a nurse.

When it comes to capacity building, another possible limitation is the use of a 360-degree camera due to its cost. Teachers who would like to learn about developing web-based related learning experiences need to know how to use the apps and systems utilized by the team.

The Web-based RLE Design will help the students to test their theoretical knowledge and also practice clinical skills to mastery since repetition of the process is possible with simulations. The 360-degree camera helped familiarize users with various medical settings. Scenes are arranged in a way wherein students can only continue if they can answer the questions correctly. The user experience needs to be continuously monitored for enhancement. The input fields and login buttons are large enough for users to see when they log in. The font and component sizes are generally large enough for the user to see the buttons to be clicked.

This has significantly improved the aesthetics of Usability. The color scheme that was chosen was on the brighter side, with the goal of making the website more appealing. The team also considered the law of common region and the law of proximity, as all of the functionalities that are associated with the primary component have been grouped. These include functions for adding, editing and deleting data. These are organized into groups and arranged in the section.

The usage of YouTube not only addresses a lot of technical challenges when posting videos, but the simple user interface is also greatly beneficial to students and staff members who are not technologically savvy.

The fact that the primary emphasis was placed on developing a web-based RLE that was based on a hospital environment is one of the limitations of the study. It is essential to recognize the value that nurses bring to a variety of settings, including community health centers and outpatient clinics. It was also pointed out that the majority of the connected learning activities, if not all of them, focus solely on patient care. The researchers are aware that it is necessary to also include other roles, such as teaching and research, both of which are fundamental capabilities that are required of a nurse.

When it comes to capacity building, the high cost of 360-degree cameras presents yet another potential barrier that must be overcome. Teachers who are interested in developing web-based learning experiences for their students will need to be familiar with the apps and computer systems that are being used by the development team.

### Future Works

The authors are currently implementing and monitoring the web-based RLE. Actors who portray nurses face a serious challenge, as the nursing skills they portray must always be accurate. The IT team is primarily concerned with achieving deadlines, such as refining videos and modifying them based on the feedback of experts.

Evaluation shall follow which will be participated by students enrolled during the second semester of AY 2022-23 and faculty members, this shall be done using the U.S.E. Survey (usefulness, ease of use, and satisfaction). There will also be a post-conference to conduct a SWOT analysis and appraise the program using the feedback from the users as well as a focused group discussion. The authors plan to conclude the project by conducting capacity building for other constituent universities and other programs, and a final research and disseminating the results in future conferences and publications.

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