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The development of a disruption responsive smart room technology with attendance management system

Jennifer P. Juaneza
Carlos Hilado Memorial State University-Binalbagan Campus, Philippines
jennifer.juaneza@chmsc.edu.ph

ABSTRACT

This paper discusses the development of a disruption responsive smart room technology with an Attendance Management System. It outlines the key features of the technology, such as the use of sensors to identify environmental changes, the creation of algorithms to comprehend and react to these changes, and the integration of smart devices to facilitate smooth communication and control. The disruptive responsive technology has transformed traditional processes and industrial practices combined with the latest smart technology that evolved locally and globally. The proponent of this study created the Development of a Disruption Responsive Smart Room Technology, which will allow modern technologies to be used to generate a substantial difference from the traditional ones. The objectives of this study were to establish an RFID (Radio Frequency Identification)-based registration and identification system for faculty and students that will help with the accuracy of attendance management and an electrical supply relay socket that will enable the function of a smart room technology that will give the faculty the power to control the devices connected to and networked with a mobile console. The automatic temperature change based on the humidity levels of the room utilizing the humidity sensor is another highlight of the study. The technology needs to be linked to a network and the internet in order to function as intended. The researcher used Developmental Research in this study and utilized the Agile Methodology, which includes all of its phases. Its purpose is to assess the research effectiveness and efficiency with an excellent rating from its respondents. The paper concludes with an evaluation of the potential issues with the technology's development and application and provides recommendations for further research in this area.

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INTRODUCTION

Innovation and invention established a great impact in the development of society in lieu of technology. It continues to provide people with an enormous change in the way they interact, the processes that they have to undertake, and the improvement in one's system to perform exceptional services to its stakeholders. In light of this, the researcher conducted studies on disruption-responsive smart room technology with the attendance management system, which will offer a modern technology capability in controlling the technological devices or equipment inside of the room. Defining disruption-responsive systems are new innovations that will cater to the development of different kinds of technologies that will change the way most businesses, industries, and consumers operate (Smith, 2020). A process known as disruptive innovation refers to the way a service or product primarily establishes itself in basic applications at the bottom of an industry typically by being more affordable and accessible and then relentlessly progresses the economy, eventually overtaking established competitors (Writer, 2021). Disruptive responsive technology has transformed traditional processes and industrial practices combined with the latest smart technology that evolved locally and globally.

The development of smart room technology has revolutionized the way we live and interact with our environment. One area that has seen significant growth in recent years is smart rooms, which integrate various technologies such as artificial intelligence, the Internet of Things (IoT), and automation to create a more intuitive and responsive living space. However, despite the rapid advancements in this field, the current systems still face several challenges such as managing and responding to disruptive events in real time. The utilization of RFID technology to manage student attendance in the classroom through the integration of ubiquitous computing systems. RFID technology has the potential to be an effective tool for managing student attendance throughout the duration of a typical school day yet also enhancing security within the classroom. (Patel, 2012). This research study aimed to present the development of a disruptive responsive smart room technology that can detect and manage unexpected events, improving the overall user experience in utilizing the RFID, Humidity Sensors, and the attendance management system. RFID applications, such as an automatic attendance registration system, quickly and effectively identify any material object (Alrikabi, 2018). The proposed solution is based on the integration of advanced sensors, machine learning algorithms, and real-time communication systems, providing a comprehensive solution for a smarter and more responsive living space.

A university known as Carlos Hilado Memorial State University-Binalbagan Campus is situated in the southern part of Negros Occidental, Philippines. A university that offers higher education to undergraduate and graduate courses such as Information Technology, Business Administration, Fisheries, Criminology and Teacher Education. Currently, there is no system in place at the campus to manage disruptive developments in devices and equipment in a classroom setting or laboratory room. Most of the classrooms are still into a traditional setting where you can see blackboards and chairs only. With the use of modern technology, the researcher developed a Disruption Responsive Smart Room Technology that would evaluate how well a room's equipment is being utilized once it has been transformed into a smart room using the Internet of Things (IOT). The term "Internet of Things" refers to a network of connected devices that produce and exchange information that is accessible to everyone, including observational data, facts, and other information. The smart room model is presented in this work utilizing sensors and microcontrollers to automate the use of electronic gadgets and the security of a room using the Internet of Things approach. (Cucus, 2019)

The Internet of Things (IoT) is used to ensure that the devices in the room, such as electronic devices, equipment, appliances, and the network, can interact efficiently and function properly according to the system developed. The Internet-of-Things (IoT) is a concept for a network of intelligent, communicative items, including wearable technology, automobiles, factory equipment, home appliances, and a variety of sensors (Hoque, 2019). In this study, the Internet of Things (IoT) is defined as the communication of devices, servers, and networks to ensure that communication is distributed to the network using RFID (radio frequency identification) devices connected to the web-based Attendance management system and mobile console application that controls the electrical socket relay for the equipment inside the smart room. Through electromagnetic or electrostatic coupling in the radio

frequency region of the electromagnetic spectrum, RFID (radio frequency identification) is a method of wireless communication that enables an object, animal, or people to be individually identified (Amsler, 2021).

OBJECTIVES OF THE STUDY

The study aimed to develop a Disruption Responsive Smart Room Technology for Carlos Hilado Memorial State University-Binalbagan Campus. Specifically, it aimed to achieve the following: (1) Design and develop a disruptive responsive technology and a system that will feature the following: (a) An RFID-Based registration and identification of Faculty and Students, (b) a Room Scheduling based on class information, (c) Customizable room temperature and electrical supply control through socket relay power, and (d) Device logging and attendance management system. (2) Assess the developed features and functions of the system based on the Expert's evaluation using the ISO/IEC 25010 that measure the quality characteristics of the system and technology based on the eight (8) criteria such as the RFID-based registration and identification, device logging and attendance management system. (3) Determine and assess the effectiveness of the proposed features such as an RFID-based system, device logging, and attendance management system based on the SUS (System Usability Scale Questionnaire).

MATERIALS AND METHODS

A. Conceptual Framework

For the input, it illustrates the knowledge requirements that involve the first stages of the development of the study such as research on the background of the study, user requirements, development tools, and technique and review of related literature and prior art search. In the process phase, it is discussed how the researcher was able to design and develop the system by following a step-by-step process utilizing the agile methodology. The output of the study is Disruption Responsive Smart Room Technology with the attendance management system. Last but not least, the results highlighted the advantages of the system to the user, including automating the process of powering components based on the configuration of the faculty using a mobile app and software program, effectively tracking student attendance and generating reports, and an automated attendance checking upon entering the room using RFID (Radio Frequency Identification).

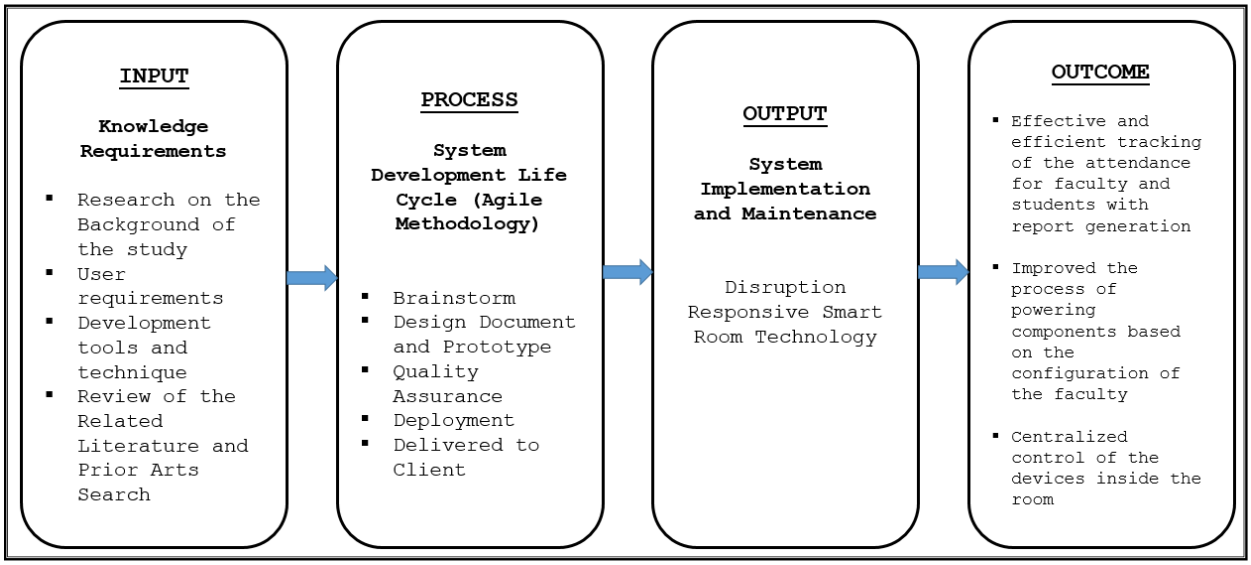

Figure 1. Conceptual Framework

B. Research Design

The researcher used the Developmental Research design in this study. It specifically intends to determine the efficiency and effectiveness of the Development of Disruption Responsive Smart Room Technology by utilizing the development of technological innovation and advancement.

Developmental research systematically investigates designing, creating, and evaluating informative procedures, products, and programs that must comply with internal consistency as well as effectiveness standards. Developmental research is very important when discussing educational technologies. The situations that occur most frequently in developmental research involve instances where the method of developing a product is examined, recorded, and evaluated (Rita, 1994).

C. Respondents of the Study

Faculty and students from the university who tested the functionality of the Disruption Responsive Smart Room Technology were among the study's respondents.

The table below summarizes the findings of the evaluators who examined the devices, mobile applications, and software of the Disruption Responsive Smart Room Technology. They are divided into categories based on their occupations.

Table 1. Summary of Evaluators during the Initial Testing and User Acceptance Testing

Evaluators Classification	Number of Evaluators
A. Expert's Group	5
B. Sample Population Group	
B.1. Students	15
B.2. Faculty	2
Total	22

Table 1 shows the summary of the respondents where it was divided into three (3) categories such as the Expert's group, Students and Faculty.

Table 2. Expert's Profile

Expert	Profession	Personal Information
1	Instructor/Student Organization Adviser	Doctor of Philosophy in Technology Management
2	Instructor/ ICT Coordinator	Master in Information Technology
3	Instructor/ Training Coordinator	Master in Information Technology
4	Instructor/ Program Head CPSU	Master of Science in Information Technology
5	Instructor	Master of Science in Information Technology

Table 2 shows the expert's profile who conducted the actual testing on the system and the devices for this study. The students were invited to conduct the actual testing of the devices and they are taking up the Bachelor of Science in Information Technology at Carlos Hilado Memorial State University, most of them are into a higher level of education.

The faculty respondents were affiliated with Carlos Hilado Memorial State University-Binalbagan Campus, and the two others were from the Central Philippines State University both located at the southern part of the Philippines Archipelago.

D. Sampling Technique

The researcher used the convenience sampling method in this dissertation. Convenience sampling, also known as availability sampling, is a sort of non-probability sampling approach that collects data from participants in the population who are readily available to be included in the study.

In this study, the researcher conducted an actual evaluation of the respondents by inviting them to test the devices and systems' functionality, performance efficiency, and accessibility. From using purposive sampling, the researcher gathered five (5) IT Experts, two (2) faculty, and fifteen (15) Bachelor of Science in Information Technology students to assess the Disruption Responsive Smart Room Technology.

E. Research Instrument

A research instrument is a data collection tool designed to gather important data needed by the researcher. This instrument signifies the importance of this study as it has been evaluated by the respondents. For objective 1, the researcher used a self-made questionnaire to evaluate the corresponding features of the system/device according to its functionality such as promptness in the devices when used and the accessibility of the system when using the RFID-Based Registration and Identification of the faculty and students.

For objective number 2, the researcher adopted the research instrument which is ISO/IEC 25010 Software Product Quality for the expert evaluation. The survey instrument is a standardized questionnaire that is used in the study to evaluate the Development of a Disruption Responsive Smart Room Technology. ISO/IEC 25010 is a quality model that is used for a product quality evaluation system that determines which quality characteristics will be taken into account when evaluating the properties of a software product (ISO/IEC 25010). To statistically compute the results of the two survey questionnaires, Mean statistics were used.

The researcher utilized the SUS (System Usability Scale), a questionnaire designed to assess the usability of products and services, to achieve target number 3. The most widely used questionnaire to assess usability is unquestionably the System Usability Scale (SUS). These survey questions, which John Brooke created in 1986 (2018), are used as a quantitative method to evaluate and get useful information on the usability of a variety of new systems, which could be either software or hardware. Only 10 items make up the System Usability Scale, and they are answered on a Likert scale. The range includes the phrases "I strongly agree" and "I strongly disagree." Your usability performance in terms of effectiveness, efficiency, and overall usability can be determined by your SUS score.

F. Data Gathering Procedures

The researcher invited fifteen (15) students from Carlos Hilado Memorial State University enrolled in information technology courses to test the functionality of the devices and experience the process of using the system to ensure that it met its objective. The evaluation was conducted using a self-made questionnaire and the SUS (System Usability Scale) questionnaire to the two (2) Faculty affiliated with the information technology department and two (2) Teacher education department.

For the expert evaluation, the researcher invited five (5) IT experts from Carlos Hilado Memorial State University and Central Philippines State University to test the functionality and the security of the devices and the system using the ISO/IEC 25010. Instructions were stated clearly and accurately in the questionnaire for the respondents to completely answer each item. Within the day, the researcher gathered the results from the respondents and used it for the tabulation and analysis in this study.

G. Data Analysis Procedures

The researcher evaluated and tabulated the statistical results for analysis and interpretation after gathering the data. The researcher determined the extent of implementation of the Disruption-Responsive Smart Room Technology for Implementation using a self-made questionnaire and ISO/IEC 25010. The analysis of the data utilizing the SUS (System Usability Scale) was, on the other hand, based on the SUS's conventional computation and basic formulas.

H. Software Life Cycle Model

The researcher used the Agile Development methodology during the development of the proposed software development. Agile has evolved into an umbrella term encompassing a variety of planning, management, and technical approaches and procedures for iteratively managing projects and developing software and other products and services (Hamilton, 2022). Figure 2 illustrates the methodology of the Agile Software Development Methodology that includes the different phases or stages such as brainstorming, design, development, quality assurance, deployment and delivery to client.

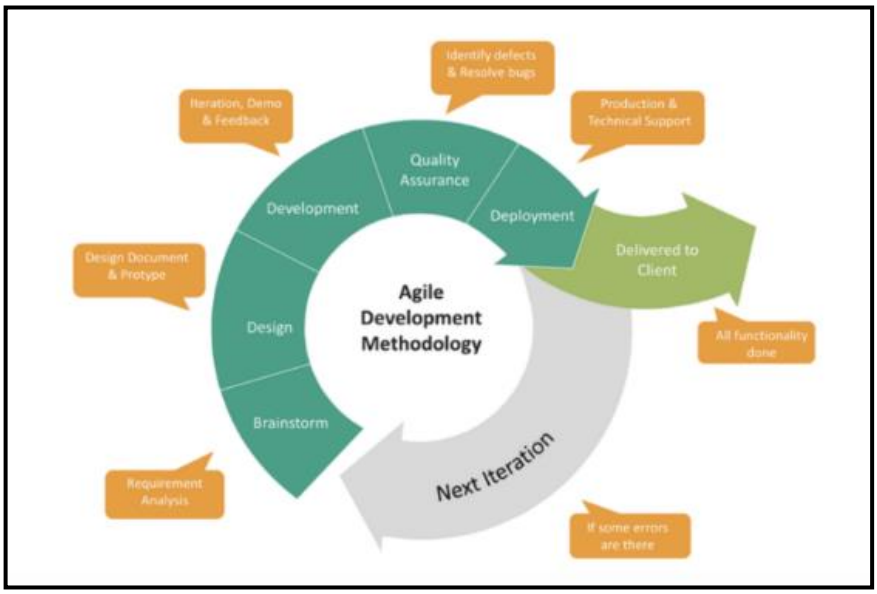

Fig. 2. Agile Software Development Methodology

The term "agile" is used to characterize methods for developing software that involves ongoing planning, learning, improvement, teamwork, evolutionary development, and early delivery. It encourages flexible responses to change. Agile development is better because its concepts, methods, and practices are suited to the specific of modern organizations. Agile frameworks and development procedures that prioritize producing working software continuously and stimulate the use of feedback to enhance the application and process are better suited to today's world of operating smarter and faster (Sacolick, 2020).

I. Software Development Phases

The Software Development Phases for Agile Methodology include brainstorming, design, development, quality assurance, deployment, and delivery to the client.

1.) Brainstorm

The researcher collaborated with the research adviser by discussing thoughts and strategies in order to come up with the probable needs and alternatives that were used in the study during the Brainstorm phase of the Agile methodology. This will complete the preparation for the software development requirements.

The duration of the project's process is estimated by the researcher using a Gantt chart. A Gantt chart, a project management tool, is used to represent a project plan. A left-side task list and a right-side timeline with schedule bars showing work are its typical two sections. The Gantt Chart the researcher utilized throughout the development process is illustrated below.

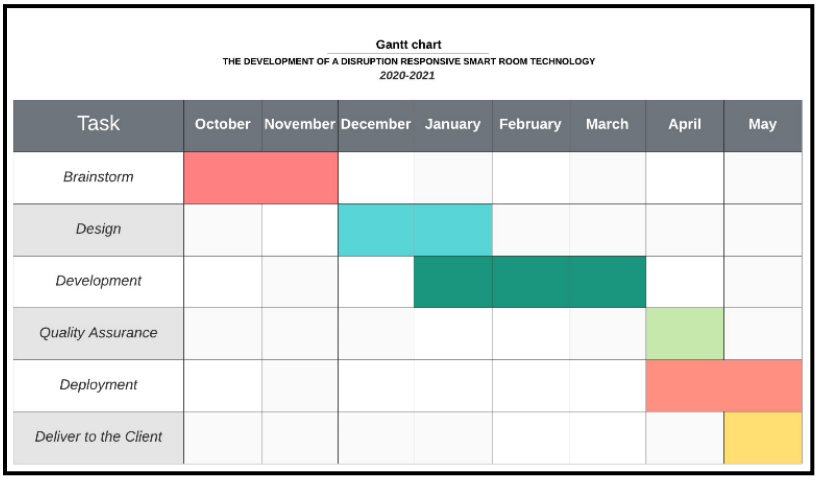

Fig. 3. Gantt Chart

2.) Design Document and Prototype

Upon gathering all the requirements that will be used in this study, a Design and development of the prototype has been done to create a visualization of the user interface and the output of the entire hardware and software application.

In the design document and prototype the researcher included the context flow diagrams, data flow diagram, operational framework, and entity-relationship diagram.

2.a) Context Flow Diagram

A data flow diagram that just shows the top level, or Level 0, is known as a context diagram or Level 0. At this level, a single visible process node serves to represent all of a system's operations, including interactions with external entities. The context flow diagram in this study identifies and explains the process of the Development of Disruption Responsive Smart Room Technology to fully understand the concept of the system application.

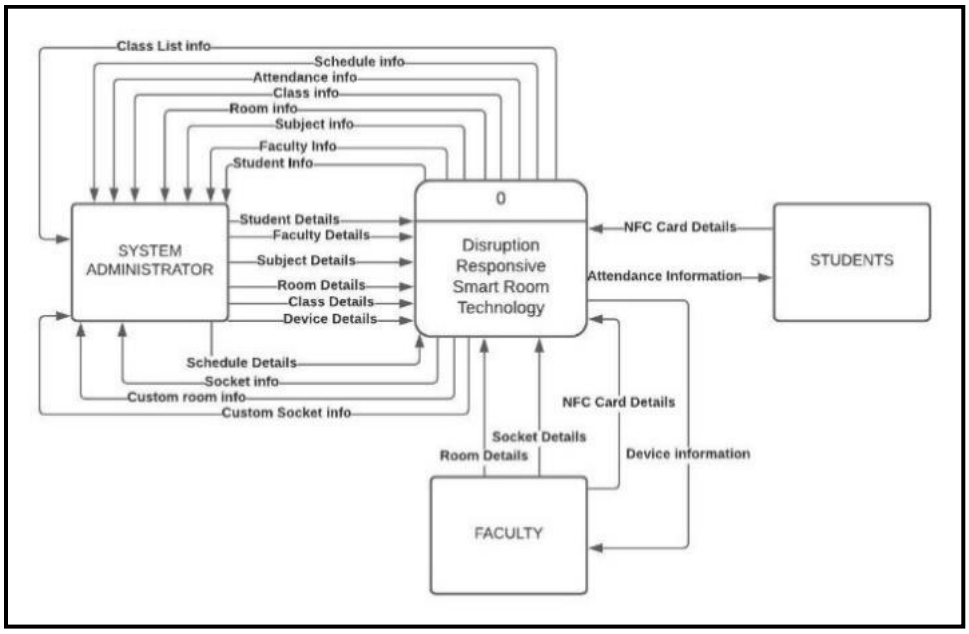

Fig. 4. Context Flow Diagram

2.b) Data Flow Diagram

The process flow includes the manage end-user information, managing device and components, creating schedules, configuring devices response, performing device transactions, and generating reports. The data flow diagram shows the interconnection of the data through the use of the databases.

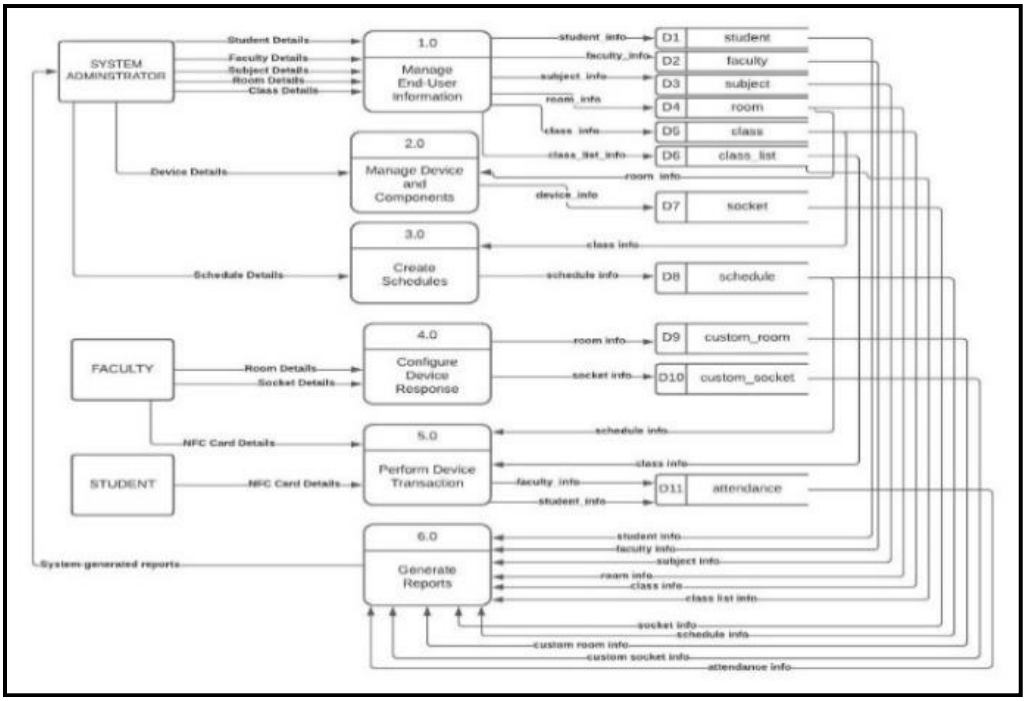

Fig. 5. Data Flow Diagram

2.c) Operational Framework

The Operational Framework for the Disruption Responsive Smart Room Technology illustrates the overall process flow of the application.

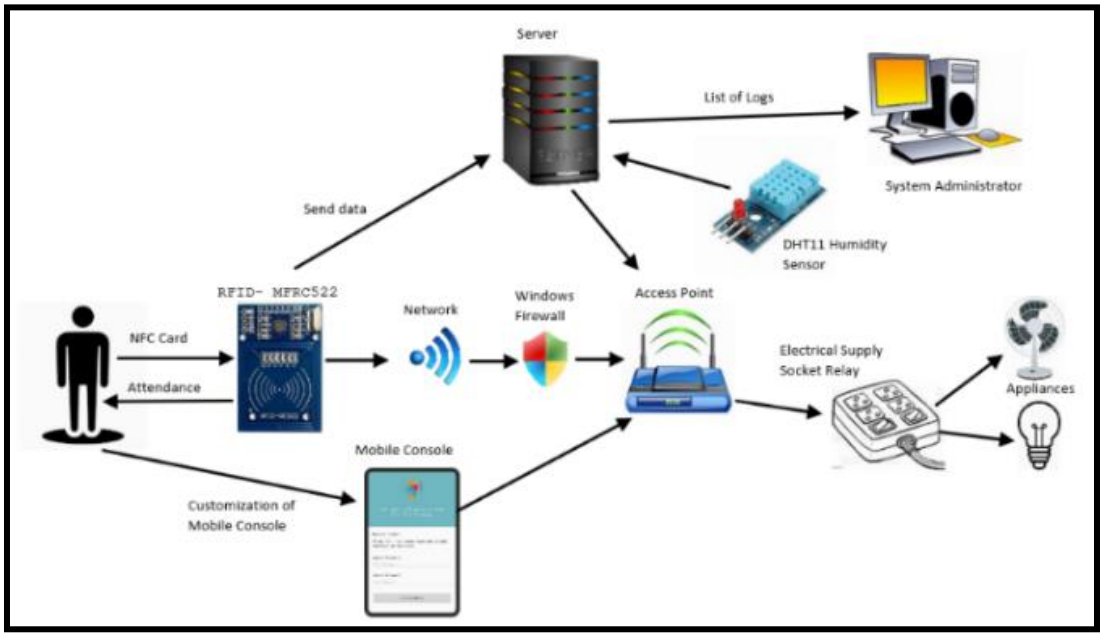

Fig.6. Operational Framework

In order to access the classroom, the user must first tap his or her NFC card on the RFID reader. For the students, it is only used to record their attendance in class, and after tapping on the RFID, their information is automatically saved on the system's device logs and sent to the server. Moreover, the faculty is authorized to customize any potential devices or equipment that will be used inside the classroom using a mobile console application through the same network on the electrical supply relay sockets where the appliances inside the smart room are connected.

For disruptive responsive occurrences, if the room is already full of students and faculty, then the presence of the humidity sensor will measure the temperature inside the room, if the humidity is higher the temperature value on the aircon will decrease up to its maximum standard. On the other hand, if the humidity is lower the temperature value on the aircon will increase up to its maximum standard. This technology needed to use the network connection of the internet in order for the devices and the system to work in a perceivable process.

2.d) User Design Interfaces

The Disruption responsive smart room technology's design is shown in the User Interface Design. It will be improved in accordance with the demands and requirements of the users.

User design interfaces exhibit the prototype of each component of the system program in accordance with the specific objectives of the study. The mobile application and system were developed with a simple design and vibrant colors to make the appearance more convenient and user-friendly to its end-users.

Fig. 7. Log-in Page for Faculty in Mobile Console

Figure 7 shows the user interface of the Log-in Page for the faculty in using the Mobile Console Application, the account username and account password is required to be authenticate by the system.

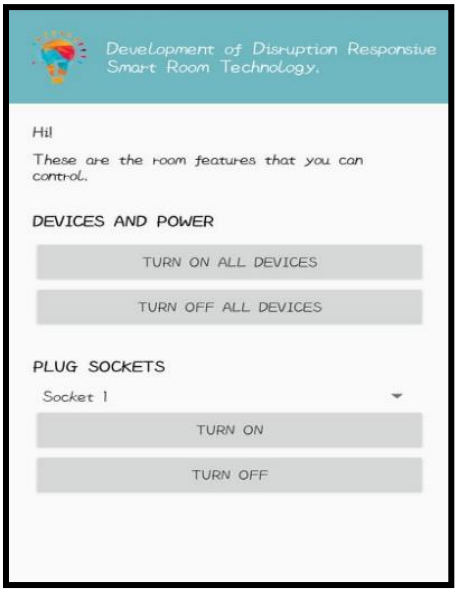

Fig. 8. Mobile Console User Interface

Figure 8 shows the mobile console user interface for the customization of the devices inside the room where the user will be able to turn on and turn off all devices or either can choose on the plug sockets number and manually turn on and turn off the devices. This is connected to the internet connection network. The devices should be synchronized in the same network of the internet connection to function accordingly.

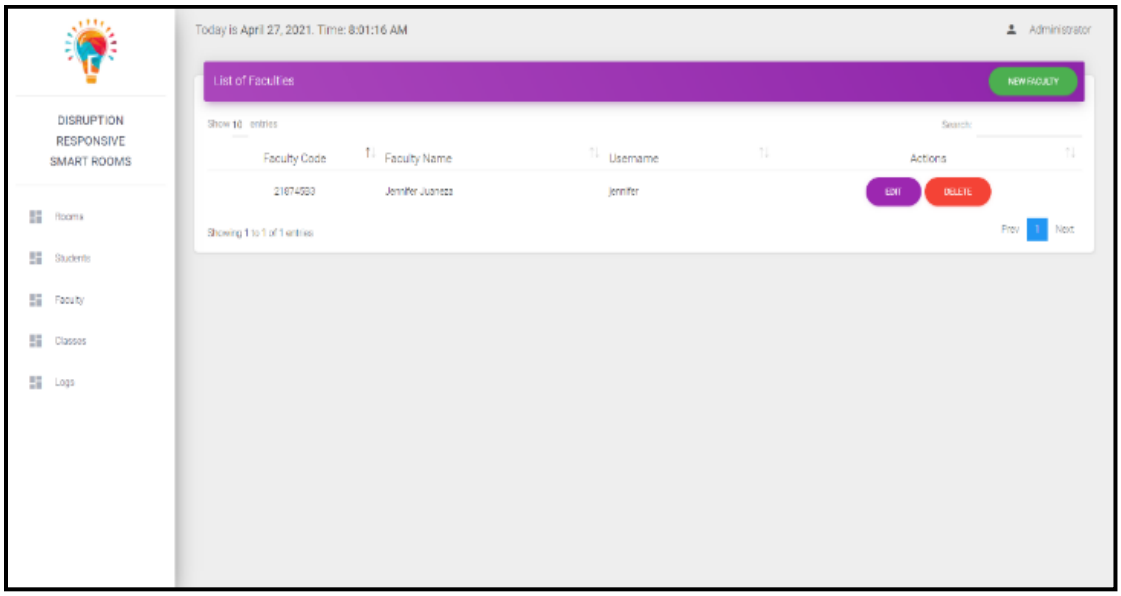

Fig. 9. Faculty Dashboard Interface

The faculty dashboard interface, shown in Figure 9, allows the administrator to view the list of faculties that have registered in the system. The administrator can also register new faculty members and input their information.

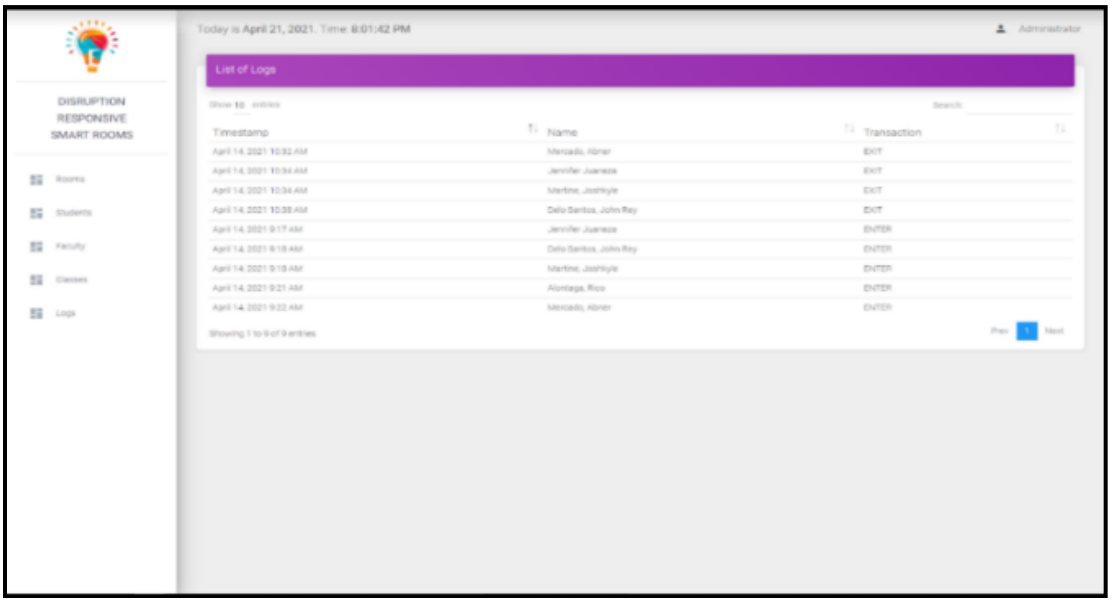

Fig. 10. List of Logs in the System

When a faculty member and a student enter the classroom, Figure 10 displays a list of Logs. This also provides you with information as to how many students are in each class. The list of logs will show the name of the student, the time they entered and exited the room.

3.) Development

The system was designed by the researcher in accordance with user requirements once the design document and prototype were completed and authorized for their output. The developer builds the system through a series of iterations from the initial stages of the development process, displays it to the user, and then modifies it if the user is not satisfied with the results.

Before engaging on the construction of the system, the researcher validates the requirements of the Disruption Responsive Smart Room Technology throughout the development phase. Several attempts on the logical functions of the equipment to see whether they are working in accordance with the study's objectives. In line with this, the developer could complete and make sure that the system is 100% in functionality.

4.) Quality Assurance

Software testing quality assurance is a method for verifying the quality of software products or services that an organization offers to clients. Making the software development process more effective and efficient in compliance with the relevant standards defined for software products is what quality assurance is all about (Hamilton, 2022).

The Development of a Disruption Responsive Smart Room Technology is very efficient for assessment by system respondents. The input of the respondents will be considered for the enhancement of the system, and the developer will be able to identify errors in the system and device if they are functioning properly. As an outcome, the developer will be able to enhance or improve the system and device to ensure that it is completely functional.

5.) Deployment

Software deployment is one of the most crucial steps in the software development process. The process of delivering updates, patches, modules, and applications to users is known as deployment. How quickly and effectively a product responds to changes in customer preferences or requirements depends on the procedures developers use to write, test, and release new code (Software Deployment, 2019).

The implementation of the system will vary on the technicalities and materials to be used by the respondents and trainings on how to use the system is the major consideration on this stage. If ever that during this phase, there are some errors in the system and if there are requirements that are not yet achieved then the developer will schedule the next iteration.

6.) Delivered to Client

Business and product owners that must present a written program based on a client's demands are often involved in software delivery. All of the application's features are thoroughly described. Following the programming, the software should be subjected to a series of quality assurance tests to confirm that it meets the requirements. All of this is completed before the final software is developed (Techslang, 2021).

During this phase, the developer ensures that the system is fully functioning and meets the stakeholders' requirements. The system will be handed over to the institution and ready for installation and implementation of the equipment, devices, and software program.

RESULTS AND DISCUSSION

Based on the survey conducted by the researcher from the respondents of the study, the results of the evaluation and assessment were explained and discussed informatively for the summary of findings of the Development of a Disruption Responsive Smart Room Technology.

On the Development of a Disruption Responsive Smart Room Technology the following results and findings has been derived based on the Experts Evaluation.

Table 3. Summary of the Experts Evaluation of the proposed Disruption Responsive Smart room technology.

	Mean	Verbal Interpretation
Functional Suitability	4.93	Excellent
Performance Efficiency	4.80	Excellent
Compatibility	4.90	Excellent
Usability	4.80	Excellent
Reliability	4.60	Excellent
Security	4.72	Excellent
Maintainability	4.70	Excellent
Portability	4.80	Excellent

The results of the experts on the various areas of the proposed Disruption Responsive Smart Room Technology yielded a mean of 4.76 which is described as "Excellent" because of it achieved the criteria set forth by the system in achieving the objectives of the study. The five experts agreed that the proposed system was able to meet the requirements set forth by the users through the different functionalities of the devices and the software program.

The design of the system is simple yet, it provides the necessary operations and functions of a Disruption Responsive Smart Room Technology based on the objectives of the study. In relation to the end-user's evaluation, a self-made questionnaire was used to rate the objective number 1 in accordance with its functionality, speed and accuracy of the system and devices presented during the testing phase.

Table 4. Summary of End-user evaluation using the self-made questionnaire

Criteria	Mean	Verbal Interpretation
Promptness in using the RFID-Based Registration and Identification of Faculty and Students	4.82	Excellent
Efficient use of the Room Scheduling based on class information	4.71	Excellent
Functionality of its Customizable room temperature and sockets power.	4.76	Excellent
Accuracy in Device logging and attendance management	4.71	Excellent

Based to the real-time synchronization of the data while utilizing the RFID, the mean for faculty and student registration and identification using RFID (Radio Frequency Identification) was 4.82, which was regarded as "Excellent." Because the user can modify the program for their class scheduling, the mean for Efficiency in Room Scheduling based on Class Information was 4.71, which was regarded as "Excellent." The mean score for its adjustable room temperature and socket power was 4.76, which was evaluated as "Excellent" since it delivers consistent function when in use. In terms of Accuracy in Device logging and attendance management, the mean was 4.71 which was interpreted as “Excellent” when using the RFID for entering the room, the user’s information was accurately and automatically captured by the system.

Table 5. System Usability Scale Score of the Disruption Responsive Smart Room Technology

CRITERIA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	AVERAGE
1	5	5	4	5	5	4	4	5	5	5	5	5	5	4	4	5	4	4.6
2	1	1	2	1	1	2	3	1	1	1	1	2	1	2	2	1	3	1.5
3	5	4	5	5	5	4	5	5	5	5	5	5	5	4	4	5	4	4.7
4	1	2	1	1	4	2	3	1	2	1	2	2	3	2	1	1	2	1.8
5	5	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	4	4.9
6	1	2	1	1	1	2	2	3	2	1	1	1	2	2	1	3	2	1.6
7	4	4	4	5	5	4	4	5	5	5	5	5	4	4	4	5	4	4.5
8	1	1	1	1	2	1	2	1	1	1	3	3	2	2	3	1	3	1.7
9	5	5	5	5	5	5	4	3	5	5	5	4	4	5	5	5	4	4.6
10	1	1	1	2	3	2	3	3	2	2	1	2	1	2	1	2	2	1.8
SUS RAW SCORE:	39	36	36	39	34	33	29	34	37	39	37	34	34	32	34	37	28	34.8
SUS FINAL SCORE:	98	90	90	98	85	83	73	85	93	98	93	85	85	80	85	93	70	87

Table 5 shows that using the System Usability Scale (SUS) for the evaluation of the respondents on the devices and the system it achieved the final score value of **87**, Grade A which is interpreted as Excellent in its effectiveness according to the Verbal Interpretation.

Findings

The Development of a Disruption Responsive Smart Room Technology study prior to the end-user evaluation for objective 1 had a numerical value of 4.75 on the overall rating which is verbally interpreted as Excellent. In terms of the Promptness in using the RFID-Based Registration and Identification of Faculty and Students it had a numerical value of 4.82, for its Efficiency in the usage of the Room Scheduling based on class information it had a numerical value of 4.71, on its functionality for the Customizable room temperature and sockets power it had a numerical value of 4.76 and on the accuracy in Device logging and attendance management, it had a numerical value of 4.71 which are all interpreted as Excellent based on the verbal interpretation.

The proposed Development of a Disruption Responsive Smart Room Technology had a numerical value of 4.76 which is verbally interpreted as Excellent prior to the Expert’s Evaluation. In terms of its reliability, it has a mean value of 4.6 which was interpreted as Excellent, and its functionality has a mean value of 4.93 which is also interpreted as Excellent.

The level of usability of the Development of a Disruption Responsive Smart Room Technology has a mean of 4.8 which was interpreted as Excellent. These findings meant that the system and devices possessed a high level of usability whereby the users were able to easily use the system due to the simplicity of the design and yet high performing functions.

The Performance Efficiency of the Development of a Disruption Responsive Smart Room Technology has a mean value of 4.73 which was interpreted as Excellent, it reflected that as far as performance of the system and devices are concerned, the respondents believed that it is effective and efficient to use and can be installed in Carlos Hilado Memorial State College.

The findings proved that with the proposed Development of a Disruption Responsive Smart Room Technology when evaluated by the expert, in terms of its reliability is concerned, the respondents agreed that it is always operational, accessible, and responsive. During the evaluation of the system and device, most of the respondents are impressed and satisfied by the way for which the functionality of the system and devices are proven.

These findings simply implied that the Development of a Disruption Responsive Smart Room Technology has a high level of functional suitability.

The study on the Development of a Disruption Responsive Smart room technology prior to the end-users evaluation using the SUS (System Usability Scale), has a SUS final score of 87 which is interpreted as Grade A and Excellent. These findings proved that the system and the devices are user-friendly, accessible, functional, and recommended to use by the end user.

CONCLUSION AND RECOMMENDATION

Designed and developed a Disruption Responsive Smart Room Technology with the following technical features: (a) RFID-Based Registration and Identification of Faculty and Students where the system and devices provide the mechanism for the user to be identified and have the capacity to log in into the system. (b)Room scheduling is based on class information where the faculty can select the available rooms that have the system or devices installed. (c) Customizable room temperature and Electrical Supply Control through sockets where the devices can be controlled with the mobile console, it has the capability of turning on and off the appliances or devices that are instilled in the sockets which makes it a smart room technology. (d) Device logging and attendance management where the system is able to monitor the in and out of the user which is the faculty and the students inside the room.

It has been concluded that prior to the expert's evaluation, the study of the development of a disruption-responsive smart room technology is highly acceptable because of its excellent result on the evaluation. It has been concluded that based on the faculty and student's evaluation the study was highly acceptable because of its excellent result on the evaluation of the usefulness and performance efficiency of the system and devices.

Based on the findings and conclusions derived from the study, the following recommendations were the following: (1) It is highly suggested that the Development of a Disruption Responsive Smart Room Technology should be implemented at Carlos Hilado Memorial State University to upgrade their facilities and technologies in terms of having a smart room technology on the offices or laboratory rooms. (2) Once implemented, the administration must conduct an orientation for its faculty and students who will use the system and devices. It is also recommended to provide important information about the advantages of the system. (3) The installation of the system and devices will provide direct access to its end-user; therefore, maintenance and training should be in place for the implementation of the system and devices.

REFERENCES

Amsler, S. & Shea, S. (2021). RFID (radio frequency identification). https://www.techtarget.com/iotagenda/definition/RFID-radio-frequency-identification

Endra, R.Y., Cucus, A., & Affandi, F.N. (2019). The concept and implementation of smart room using Internet of things (IoT) for cost efficiency and room security. *Journal of Physics: Conference Series*, 1381(1), 012018. https://doi.org/10.1088/1742-6596/1381/1/012018

Hamilton, T. (2022). Agile Methodology: What is Agile Model in Software Testing? Guru99. https://www.guru99.com/agile-scrum-extreme-testing.html

Hamilton. T. (2022). What is quality Assurance (QA)? Process, methods, examples. Guru99. https://www.guru99.com/all-about-quality-assurance.html

ISO/IEC 25010. (n.d.). Retrieved from https://iso25000.com/index.php/en/iso-25000-standards/iso-25010?start=0

Rita. (1994). Developmental research: The definition and scope. ERIC. https://eric.ed.gov/?id=ED373753

Sacolick, I. (2020). What is Agile methodology? Modern software development explained. InfoWorld. https://www.infoworld.com/article/3237508/what-is-agile-methodology-modern-software-development-explained.html?page=2

SMITH, T. (2020). *Disruptive Technology*. https://www.investopedia.com/terms/d/disruptive-technology.asp

Software deployment. (2019). Sumo Logic. https://www.sumologic.com/glossary/software-deployment/

Techslang. (2021). What is software delivery? — Definition by Techslang. Techslang — Tech Explained in Simple Terms. https://www.techslang.com/definition/what-is-software-delivery/

QuestionPro. (2018). What is system usability scale? Retrieved from https://www.questionpro.com/blog/system-usability-scale/

Writer, S.S. (2021). The Theory of Disruptive Innovation. https://www.stratrix.com/disruptive-innovation-christensen/