# **Saint Vincent College of**

# **Cabuyao's Web-Based**

# **System for Borrowing and**

# **Tracking Sports**

# **Equipment**

# **CASE STUDY**

# **Saint Vincent College of Cabuyao**

# **System Analysis and Design**

**by**

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**3rd Year Bachelor of Science in Information Technology**

**Topic No. 1**

1. **General Subject Area**

Sports: Sports equipment borrowing and tracking web-based application for St. Vincent College of Cabuyao

1. **Specific Topic**

# **Saint Vincent College of**

# **Cabuyao's Web-Based**

# **System for Borrowing and**

# **Tracking Sports**

# **Equipment**

**INTRODUCTION**

In today’s generation, where technology is rapidly advancing and digital solutions are becoming more intertwined with our lives, educational institutions are constantly looking for innovative ways to streamline administrative tasks and improve the overall experience for students. This study aims to address one area of improvement within the infrastructure of Saint Vincent College of Cabuyao the management of sports equipment lending.

Physical education and sports activities play a role in providing a rounded education. By offering students access to sports equipment, the researchers don’t encourage fitness but also nurture teamwork, discipline, and overall well-being. However, managing and distributing of the equipment can sometimes pose challenges that disrupt the flow of these activities. Common issues such, as delays, miscommunication or potential shortages can negatively impact both student engagement and the school’s resources.

This research aims to improve Saint Vincent College of Cabuyao's sports equipment borrowing process by developing a web-based application. The application will streamline the process, provide a user-friendly interface for students and faculty, enhance transparency, and accessibility of equipment-related information. The research aims to design and implement the application intuitively, assess its impact on efficiency, student participation in sports activities, and overall resource allocation. The study will explore the challenges faced by the school in managing sports equipment, explore the technological landscape of web applications for educational contexts, outline the methodology used, and discuss potential benefits. This initiative aims to modernize administrative practices and enhance student experiences.

**BACKGROUND OF THE STUDY**

Physical education and sports activities are crucial for student development, but managing sports equipment is a challenge. Traditional systems often result in inefficiencies, miscommunications, and resource allocation issues. Technological advancements offer an opportunity to transform this process by developing a web-based application for school sports equipment management. This application streamlines administrative workflows, enhances student experience, and improves transparency. This research aims to create a user-centric application that simplifies the borrowing process, optimizes resource allocation, and encourages student participation in sports activities. This project will evaluate the application's impact on borrowing efficiency, student engagement, administrative workflows, setting a standard for improved resource management, and enhanced student experiences.

**OBJECTIVES (general & specific)**

• This research aims to create a user-friendly web application for Saint Vincent's sports equipment management system, allowing students and faculty to request, reserve, and track equipment availability.

• To improve the sports equipment borrowing process at Saint Vincent by implementing a web application to reduce delays, miscommunications, and administrative overheads.

• Enhance transparency and accessibility of sports equipment availability information, enabling real-time access for students and faculty, and to promote student engagement in sports activities through an efficient platform for borrowing equipment.

• Evaluate the web application's impact on school resource allocation by analyzing equipment usage and demand patterns to optimize utilization.

• Set a model for technological innovation in educational institutions by implementing a web application to solve practical challenges and contribute to St. Vincent College of Cabuyao’s educational excellence by providing a seamless sports inventory managing.

Manageability (scope & limitations)

Scope of the study

• This research project will develop and implement a web-based application for St. Vincent College of Cabuyao's sports inventory system, covering key areas such as design, development, and implementation.

• This project will involve the researcher to understand student and faculty needs, designing an application with interface, features, and functionalities to streamline equipment borrowing.

• A well-structured database will manage sports equipment inventory, reservations, and availability, while a web application will be developed for features like equipment browsing, reservation requests, and user authentication.

• The application will undergo rigorous usability testing to identify and address user experience challenges, and an impact assessment will evaluate its efficiency in sports equipment borrowing, student participation, and administrative workflows.

**Limitations of the study**

• This research project aims to enhance student engagement in a specific institution, but it faces limitations such as its institution-specific context, technological constraints, resource availability, user adoption, external factors, ethical considerations, and sustainability. The findings will be influenced by existing systems, hardware, programming languages, user familiarity, and external factors like changes in school policies or technological advancements. Ethical considerations and institutional commitment will also play a role in the project's long-term sustainability.

• This research project focuses on creating a Saint Vincent-specific web-based sports equipment borrowing application but acknowledges limitations and requires careful interpretation of findings.

**CHAPTER 1**

**INTRODUCTION**

Physical education is a vital part of a student's education. It helps students stay healthy and teaches valuable teamwork skills. That's why schools should provide physical education classes for everyone. These classes encourage students to be active and enjoy fun activities, which can lead to a lifelong habit of staying physically fit. What's interesting is that research shows that being physically active can boost academic performance. In fact, one study found that students who are active tend to earn better grades and are more likely to graduate from high school.

In the past, schools relied on old-fashioned paper systems to manage sports equipment, causing problems like delays, confusion, and limited access for students. The researchers decided to create a web-based application that will help the school administrator to manage the inventory of sports equipment. This application can simplify administrative work, improve the user experience, and encourage more student involvement in sports.

This web-based application serves a multifaceted role, delivering significant advantages to both the educational institution and its students. It fosters a culture of responsibility among students when requesting equipment, simultaneously affording administrator a seamless and efficient authorization process.

**1.1 Background of the study**

In St. Vincent College of Cabuyao, physical education and sports are essential for students' growth. Nevertheless, the management of sports equipment has historically posed logistical challenges. It becomes accustomed to needing an ID to borrow sports equipment. It can be somewhat inconvenient because students are not sure about the equipment they have, which caused delays, mix-ups, and made it hard for students to access the gear they needed.

The researchers decided to create a web-based application to streamline transactions, making it easy to check equipment availability. The application isn't just about convenience, it's about making life easier for administrators to facilitate the equipment effectively.

**1.2 Statement of the problem**

The researchers noticed a common challenge in Saint Vincent College of Cabuyao, the student IDs are always needed to borrow sports equipment. This process can be inconvenient and uncertain since we often don't know what equipment is available. That's why the researchers have taken on the task of developing a web-based application. The researchers’ goal is to simplify equipment transactions and provide a reliable way to check equipment availability.

Specific problems:

• Having trouble knowing if they have available equipment you need

• Depositing ID when requesting an equipment.

• Having trouble when borrowing if the professor who is assigned in sports equipment is busy or on duty, requesting is expected to be delayed.

**1.3 Objectives of the study**

The goal of this study is to create a web-based application for St. Vincent College of Cabuyao to help the administrator for sports equipment facilitating. It will streamline the process of borrowing sports equipment, making it more convenient for students.

Specific objectives

• To provide a database that will help both students and faculty to ascertain what equipment is available in the inventory.

• Facilitate Admin-Student algorithm efficiency.

• To reserve the equipment early to avoid inconvenience.

• To give penalty for the late returning of equipment. This will help the student have discipline about borrowing.

­**1.4 Scope of the Study**

* Efficient Equipment Management: A sports equipment tracking system that enhances faculty's capacity to proficiently oversee their sports inventory, guaranteeing its availability when required while minimizing the potential for loss or theft.
* Accountability: Through the allocation of equipment to designated students, the system cultivates a sense of responsibility. When students are entrusted with equipment, they are more inclined to ensure its proper care and usage.
* Fair Distributions: It facilitates equitable equipment distribution among students, ensuring that all individuals have access to the necessary resources for their sporting activities.
* Budget Management: School can manage their budget by monitoring equipment usage better and identifying areas where repairs or replacements are necessary.
* Data Analysis: Over time, the data collected by the tracking system can provide insights into equipment usage patterns, helping the school to make wise decisions about purchasing and allocation.
* Security: It helps to determine theft and unauthorized use of school equipment, enhancing overall security.

**1.5 Limitations of the study**

* Cost: Implementing a tracking system can be expensive, including the cost of equipment tags, scanners, production server, and staff training. So, the researchers decided to implement QR code scanning for each of the equipment.
* Privacy Concerns: Tracking students’ use of equipment raises privacy concerns. The Administrator must ensure that the data collected is used responsibly and that student personal data is protected.
* Maintenance: The system itself requires maintenance and occasional upgrades, which can also add to the overall cost.
* Resistance from Students: Some students may resist the idea of being monitored or having to check in/out equipment. This resistance could affect the system’s effectiveness.
* Human Error: There is always a possibility of human error in the tracking process, both on the part of students and staff responsible for managing the system. This can lead to inaccuracies in the data.
* Limited Coverage: The system can only track equipment that has been tagged or registered. If equipment is not properly accounted for, it may still be lost or stolen.
* Resource Constraints: Smaller schools or those with limited staff may struggle to implement and maintain an effective tracking system.
* Technology Dependence: Relying on technology for tracking can be risky, as technical glitched or failures can disrupt the system.

**1.6 Significance of the study**

The development of a web-based system for borrowing and tracking sports equipment at Saint Vincent College of Cabuyao holds paramount significance for various stakeholders, including students, the Physical Education (P.E.) administration, and the school. This study elucidates the compelling reasons that underscore the importance of this project, emphasizing the tangible benefits it offers to each group involved.

**For Students:**

Primarily, the web-based system caters to the needs and convenience of the students. It addresses the pressing need for an efficient and streamlined process of managing sports equipment within the college. Students often find themselves in a situation where they require sports equipment for their physical education classes or extracurricular activities. The new system allows them to access and borrow sports equipment with ease, eliminating the cumbersome process of physical paperwork and significantly reducing the chances of errors or equipment loss. This improved efficiency ensures that students have unfettered access to the equipment they need, thereby promoting active participation in sports and physical activities.

Furthermore, the web-based system leverages technology to enhance accessibility and convenience for students. With a user-friendly online platform at their disposal, students can effortlessly check the availability of sports equipment, reserve items in advance, and receive notifications when their requested equipment is ready for pickup. This not only saves valuable time but also ensures a fair distribution of equipment among student users, playing sports and recreational activities more accessible to all. Students no longer need to worry about the availability of equipment or long queues to sign out items.

The system's digital tracking feature adds a layer of accountability and transparency for students. By keeping a personal record of borrowed equipment, students can conveniently monitor their responsibilities and ensure the prompt return of equipment. This fosters a sense of ownership and encourages responsible behavior among the student body. Moreover, this digital record empowers students with real-time information about their equipment transactions, helping them stay organized and avoid any unintended violations.

**For P.E. Administration:**

The benefits of the web-based system extend to the P.E. administration. Managing sports equipment inventory is a task of considerable magnitude, and the new system simplifies this process significantly. P.E. administrators can now monitor equipment usage with precision, track maintenance needs promptly, and plan for equipment procurement more efficiently. They no longer need to rely on manual record-keeping methods, reducing the chances of errors and discrepancies.

The system's digital tracking capabilities also enable the P.E. administration to identify any misuse or mishandling of equipment in real time. By maintaining accurate digital records of who has borrowed which items and for how long, administrators can swiftly address any issues related to equipment misuse or delays in returning items. This proactive approach ensures that borrowers are held accountable for their borrowed items, enhancing overall equipment management.

Additionally, the system generates valuable data and reports that assist the P.E. administration in making informed decisions. This data can reveal trends in equipment usage, preferences for different sports, and the overall demand for specific items. Armed with this information, administrators can optimize the allocation of resources, plan for equipment acquisitions strategically, and provide a better sports experience for students. In essence, the system empowers the P.E. administration to make data-driven decisions that enhance the quality of physical education and sports activities.

**For the School as a Whole:**

The implementation of this web-based system aligns seamlessly with the school's commitment to embracing technology and innovation. It serves as a testament to the institution's dedication to providing modern and efficient services to its students and staff. By leveraging technology to improve equipment management, the school showcases its commitment to technological advancement and student well-being. This initiative underscores the school's forward-thinking approach to education, creating a positive image for prospective students and faculty members.

Moreover, by promoting sports and physical activity among students, the school fosters a healthier and more active campus community. Encouraging students to actively participate in sports and physical education not only contributes to their physical well-being but also enhances their overall academic experience. Physical fitness and well-being are integral components of a holistic education, and the web-based system aligns with the school's mission to provide a well-rounded education to its students.

In conclusion, the development of a web-based system for borrowing and tracking sports equipment at Saint Vincent College of Cabuyao holds paramount significance. It benefits students by enhancing accessibility and accountability, empowers the P.E. administration by improving equipment management and decision-making, and aligns with the school's commitment to technological advancement and student well-being. This project exemplifies the school's dedication to providing modern, efficient services and fostering a healthier, more active campus community.

**CHAPTER 2**

**2.1 Related Foreign Study**

**2.1.1 Benefit of Equipment Inventory Management System**

In Manish Mohan's 2022 article, the indispensable role of equipment inventory management systems in contemporary organizations is underscored. These systems simplify equipment management by providing a comprehensive view of assets throughout their lifecycle, aiding in stock level management and risk mitigation. They excel in inventory forecasting, aligning stock levels with precise demand data to optimize order volumes. Real-time data and traceability capabilities enable informed decisions, while automation eliminates human error, saving time and ensuring accuracy. Additionally, equipment inventory management systems enhance supply chain operations by diversifying sources and maintaining optimal inventory levels. Ultimately, these systems contribute to organizational growth and success by avoiding inventory-related issues and facilitating well-informed decision-making.

<https://infraon.io/blog/benefits-of-equipment-inventory-management-system/#:~:text=Equipment%20inventory%20management%20is%20the,a%20simple%20supply%20chain%20component>.

**2.1.2 Tools and Equipment Monitoring System**

Kimmy Matillano's Tools and Equipment Monitoring System, developed in March 2021, exemplifies the integration of technology in addressing asset management challenges within the construction industry. This system's focus on preventing tool and equipment loss, transitioning from manual to computerized tracking, and its expected impact on management underscores broader trends in digitalization and efficiency enhancement. While the study's details are limited, Matillano's work serves as a testament to the evolving landscape of asset tracking systems, leaving room for future researchers to expand upon these advancements and contribute to the field's growth.

<https://itsourcecode.com/fyp/tools-and-equipment-monitoring-system-chapter-1/>

**2.1.3 Importance of QR Code Asset Management in Business**

In Carlos Virreira's blog post published on July 20, 2023, the importance of QR code asset management in today's fast-paced digital business landscape is emphasized. QR codes, as two-dimensional barcodes, offer an efficient solution for tracking and managing physical assets, such as equipment and machinery. By affixing unique QR codes to assets, businesses can streamline the identification and monitoring process. QR code asset management facilitates efficient tracking, enhances security by restricting access to authorized personnel, and results in cost savings by eliminating the need for expensive software or hardware. The process involves creating distinct QR codes for each asset, attaching them securely, scanning with mobile devices for access to asset details, and regularly auditing and maintaining data for accuracy and completeness. This approach enhances overall asset management efficiency and can greatly benefit organizations in various industries.

<https://www.shelf.nu/blog/the-importance-of-qr-code-asset-management-in-business>

**2.1.4 Asset Management Information and Tracking System with QR Code Based on the Human Centered Design Method**

In today's business landscape, particularly in establishments with inventory systems, accessing asset information can often be a time-consuming process, leading to delayed data retrieval. Addressing this issue, the research conducted by Benrahman in 2021, as cited in J. Phys.: Conf. Ser. 1830 012006, aims to streamline the acquisition of asset information for improved efficiency. The proposed method involves affixing QR Codes to asset labels, allowing data retrieval through the scanning of these QR Codes using Android smartphones. The research seeks to enhance the existing inventory system by incorporating web addresses into the QR Code labels, leveraging the widespread use of QR scanning capabilities on Android smartphones. This approach holds promise for optimizing inventory management processes. The application's testing and implementation have yielded a remarkable 99.9% validity rate, making it an asset for organizations seeking to enhance their inventory operations.

<https://iopscience.iop.org/article/10.1088/1742-6596/1830/1/012006>

**2.1.5 The Benefit of Equipment Management for schools and universities**

In a publication by Hana Belbecir dated October 14, 2021, the significance of efficient equipment management, particularly in educational institutions like schools and universities, is highlighted. The article emphasizes the need for proper equipment tracking and maintenance to reduce costs, enhance accountability, and ensure students' access to essential equipment. It underscores the benefits of implementing equipment management software, such as barcode tracking systems, to minimize human errors, centralize data accessibility, simplify annual inventory audits, and streamline the equipment checkout process. This comprehensive approach to equipment management not only saves time and resources but also contributes to a more efficient and reliable educational environment.

<https://www.cheqroom.com/blog/equipment-management-for-schools-and-universities-the-top-5-benefits/>

**2.1.6 Inventory Management for Sports Equipment: Agile Project Management**

In this Agile software development project, led by author Nicholas Barnard (2019), the goal was to create a web-based application for managing inventory and rentals within an on-campus organization, specifically focusing on the Kinesiology, Sport Studies, and Physical Education department at The College at Brockport. The project followed an Agile methodology, emphasizing client collaboration and adaptability throughout the development process. Initial requirement capture involved understanding the existing paper-based processes and creating detailed use cases, sequence diagrams, GUI mockups, and state diagrams. The team successfully implemented the Agile approach, ensuring consistent client communication and accommodating evolving requirements. The project aims to streamline equipment management processes, reduce paper usage, and enhance tracking efficiency, with the ultimate success measured by the adoption of the software in the coming year.

<https://soar.suny.edu/bitstream/handle/20.500.12648/6737/honors/245/fulltext%20%281%29.pdf?sequence=1&isAllowed=y>

**2.1.7 The Benefits of using Web-Based Applications.**

In the article authored by Phymon Khamooshi and published in December 2019, the advantages of web-based applications over desktop applications are highlighted. These web-based applications, often referred to as Software as a Service (SaaS), offer accessibility across various devices and operating systems, promoting flexible working and enhancing employee productivity. They can be easily customized for different devices and integrated with other systems, providing greater interoperability. Maintenance is simplified, with updates and upgrades managed centrally, reducing downtime and ensuring consistency. Additionally, web-based applications offer scalability, data security, and centralized data access, making them a valuable choice for businesses seeking efficiency and flexibility in their software solutions.

<https://www.geeks.ltd.uk/insights/blog/the-benefits-of-using-web-based-applications>

**2.1.8. Design Method and Application of Intelligent Sports Equipment Based on Stochastic Differential Equation**

In the article authored by Xianrong Liang and Jiangxi Yu, published in June 2023, the architecture for IoT (Internet of Things) applications in sports is discussed. The architecture comprises multiple layers, with the perceptual layer being the foundation, encompassing various sensors like EMG, ECG, EEG, and more, used to monitor a user's physical condition in sports. These sensors are connected to devices such as belts, armbands, or cuffs. The network layer handles data transmission and processing, employing communication protocols like Z-Wave, NFC, IrDA, ZigBee, and more. The sports management layer focuses on IoT applications in sports, including data analysis, statistics, 3D visualization, and cloud computing. Finally, the sports application layer involves communication protocols like MQTT, COAP, XMPP, and AMQP for seamless connectivity and messaging in IoT-based sports applications. This architecture provides a comprehensive framework for incorporating IoT technology into the sports industry. <https://www.researchgate.net/publication/372937508_Design_Method_and_Application_of_Intelligent_Sports_Equipment_Based_on_Stochastic_Differential_Equation>

**2.1.9. Tracking Systems as Thinking Machine: A Case Study of a Service Company**

In his 2018 paper, Sabah S. Al-Fedaghi underscores the significance of object tracking systems in addressing various challenges related to safety, security, and location-based applications. These systems, particularly crucial in transportation, often suffer from the lack of well-defined and comprehensible descriptions, leading to fragmented representations that hinder effective documentation. Al-Fedaghi introduces a novel diagrammatic methodology for modeling tracking systems, aiming to produce engineering-like schematics that can be utilized for documentation, explanation, communication, education, and control purposes. The paper focuses on the role of the Global Positioning System (GPS) in tracking objects and its growing importance, especially in applications such as mobility pattern recognition, vehicle navigation, fleet management, and route tracking. It highlights the need for structured modeling in vehicle-tracking systems, which involve GPS and Global System for Mobile Communications (GSM) technology to monitor vehicle status, position, and timing, ultimately contributing to the advancement of tracking system understanding and utilization. <https://www.researchgate.net/publication/329305439_Tracking_Systems_as_Thinging_Machine_A_Case_Study_of_a_Service_Company>

**2.1.10 Inventory Management System Thesis**

The study conducted by Samaro et al. underscores the significance of implementing a systemized data manipulation process for managing inventory efficiently, particularly in the context of ordering products. The authors emphasize the relevance of integrating evolving technology and technological knowledge into inventory management to enhance its effectiveness. The proposed inventory management system is designed to offer various features, including product search and data item addition or deletion, benefiting both employees and retail administration. The study's primary objective is to optimize inventory oversight and management by providing real-time inventory status data, ultimately enabling companies to realize inventory management benefits. The choice of this study is deemed reasonable due to its practical implications and potential to improve daily operations within corporations, particularly benefiting Prifood Corporation and serving as a valuable reference for future researchers.

<https://www.studocu.com/ph/document/ama-computer-learning-center/bsit/inventory-management-system-thesis/28856629>

**2.2 Related Local Study**

**2.2.1 Maximizing Equipment Monitoring through Online Management Systems**

Mark Anthony M. Tamayo's 2008 study, the importance of efficient equipment monitoring and management within organizations was highlighted. Tamayo developed an online equipment management system utilizing prescriptive analytics, with a focus on optimizing monitoring and evaluation of property equipment while minimizing technology upgrade costs. This innovative system leveraged open-source programming languages like PHP and utilized standard Android mobile phones as QR code scanners for equipment evaluation, enhancing tracking and analysis capabilities. The study achieved three specific objectives: implementing the system in the pilot area, improving data collection accuracy and timeliness, categorizing equipment conditions, and providing versatile reporting formats. Tamayo's research exemplifies practical and cost-effective approaches for organizations seeking to enhance their equipment management processes through modern technology.

<https://ijssst.info/Vol-20/No-S2/paper10.pdf>

**2.2.2 AN AUTOMATED INVENTORY SYSTEM USING QUICK RESPONSE (QR) CODE AND BARCODE FOR PROPERTY MANAGEMENT OF THE BOY SCOUTS OF THE PHILIPPINES**

In De Chavez's 2015 design paper, an automated inventory system using QR code and barcode technologies is proposed for the Boy Scouts of the Philippines (BSP) National Office –NCR. This GUI-based system, driven by C# programming, aims to modernize property management processes and meet annual inventory reporting requirements mandated by the Commission on Audit (COA). By assigning QR codes to new and expensive items and barcodes to less costly ones, the system streamlines property tracking and establishes a comprehensive database for accurate inventory reporting. It also facilitates borrower monitoring and accountability in cases of property damage or loss. To further enhance its functionality, the recommendation includes adding a printing function for automatic receipt and report generation, integrating barcode and QR code generators, and establishing department-specific databases, ultimately promising increased efficiency and accuracy in property management and reporting.

<https://docplayer.net/41495807-An-automated-inventory-system-using-quick-response-qr-code-and-barcode-for-property-management-of-the-boy-scouts-of-the-philippines.html>

**2.2.3 Development of an Attendance Checker System Using QR Code for Technological Institute of the Philippines.**

In the research conducted in 2016 by Barlin, Raphael Jericho Cagas, Divine Mary Grace Collado, Darelle Andrei Pereyra, Keilyn Rodriguez, and Joshua Rod, the primary objective was to develop an attendance checker system using QR Codes for the Technological Institute of the Philippines. The study aimed to create an efficient and accurate attendance monitoring system that would offer an alternative to the traditional manual process. By utilizing QR Codes, students could conveniently log their time in and out, reducing the time and effort required for attendance management. The researchers employed a descriptive method and conducted surveys among thirty-nine students to gather information and assess the system's usability. The results indicated that the proposed system was well-received by the students and helped the school improve attendance monitoring. This innovative approach not only minimized paperwork for teachers but also provided a reliable database for attendance records. QR Codes emerged as a versatile and practical tool for attendance management in educational institutions.

<https://www.coursehero.com/file/44887141/RESEARCH-THESIS-Copy-2docx/>

**2.2.4 Equipment Inventory Management and Transaction Recording Using Bar Coding Scheme via VB6**

In the study conducted by Geoffrey T. Salvador, PECE Laboratory Head at the Department of Electronics Engineering, College of Engineering, Polytechnic University of the Philippines, during the academic year SY 2014-2015, the aim was to implement a bar coding system using Visual Basic 6 (VB6) and Microsoft Access to automate transaction recording and equipment inventory monitoring in the PUP ECE Laboratory. The study successfully developed and recommended the "AutoLab" system, which effectively automated transaction recording by merging manual methods and utilized barcoding technology for precise recording of key and equipment transactions. The results showed a 100% efficiency rate, and the study suggested potential enhancements to the system's user interface and the integration of faculty access codes for further improvements in laboratory management and efficiency.

<https://www.ijera.com/papers/Vol6_issue6/Part%20-%203/P06060392095.pdf>

**2.2.5 Android-Based Classroom Monitoring System for Teacher Using QR Code Technology**

In the research conducted by SUSADA, RICHIE A. in 2020, the primary objective was to develop an Android-based classroom monitoring system for teachers using QR code technology. The system allowed users, particularly assigned beadles, to scan QR codes via a smartphone, which would then automatically send attendance, schedule, and user information data to a web-based system titled "Web-Based Attendance for Teacher Using QR Code." This web-based system displayed teachers' attendance records in real-time, marking them as absent, late, or under time based on class entry times. The study successfully implemented the system using Android programming technology, with a focus on JSON technology as an import library. It aimed to improve attendance monitoring for teachers, reduce administrative workload, and provide real-time attendance information. The research findings emphasized the importance of proper development and testing procedures for mobile applications like this system.

<https://deliverypdf.ssrn.com/delivery.php?ID=492099070121004125117085097064067102096038020065064007072119079005074109067103028073103004116122038058047068006127112086007007041057031008018117012127092120006012075095035080119123112088076112009000081007000096079093080002026093106010100080025127082068&EXT=pdf&INDEX=TRUE>

**2.2.6 EQUIPMENT MANAGEMENT SYSTEM FOR CENTRAL PHILIPPINE UNIVERSITYJARO ILOILO CITY**

A study by Arnesto et al. (March 2012) shows that an inventory control system is a process for managing and locating objects or materials. In common usage, the term may also refer to just the software components. Modern inventory control systems often rely upon bar codes and radio-frequency identification (RFID) tags to provide automatic identification of inventory objects. Inventory objects could include any kind of physical asset: merchandise, consumables, fixed assets, circulating tools, library books, or capital equipment. To record an inventory transaction, the system uses a barcode scanner or RFID reader to automatically identify the inventory object, and then collects additional information from the operators via fixed terminals(workstations), or mobile computers

<https://www.scribd.com/document/133250299/Equipment-Management-System-Final-Document>

**2.2.7 Laboratory Equipment Monitoring System: Towards Paperless Management – Rabago et al. (2008)**

This study aimed to design laboratory management software to effectively manage equipment maintenance, borrowing and returning, failure analysis, inventory, repair, scheduling, and flexible report generation process.

The development strategies used in the project analysis, design and development include a thorough analysis and evaluation of both the existing and the first prototype of the proposed system. Waterfall model was used in the development of the system. The system had undergone the following stages: requirements gathering and analysis, system design, implementation, testing, deployment and maintenance in the said development. The study used ISO 9126 in the evaluation of the software, which determined the acceptability of the software in terms of usability, accessibility, reliability, and maintainability. The respondents were composed of ITE students, teaching and non-teaching employees. Comprehensive analysis of the results of the evaluation was applied as basis for conclusions.

The evaluation showed that majority of the respondents from the three groups assessed the software as very acceptable in terms of functionality, reliability, usability, efficiency, maintainability, and portability. The software is also very acceptable in gaining real time visibility in equipment inventory, maintenance and borrowing and returning, and that it is also very acceptable in providing reports at the same time provide history recording of the different processes available.

<https://ejournals.ph/article.php?id=9224>

**2.2.8 WEB-BASED LOCATOR AND MONITORING SYSTEM FOR TOOLS AND EQUIPMENT IN LABORATORIES AND WORKSHOPS IN TIP ARLEGUI CAMPUS - Susan S. Caluya (2000)**

The study was conducted to evaluate the manual way of processing, borrowing, returning, and generating of reports of tools and equipment Observations showed that most of the students sign many forms when they borrow sensitive and disposable materials. There was much time consumed in generating reports. PHP database and Dreamweaver were the programs used to develop the locator and monitoring system. The study was evaluated based on the following criteria: accuracy, user-friendliness, reliability, and efficiency. In view of the evaluation of results, it was concluded that the locator and monitoring system could store borrowers’ information and status of equipment and tools used efficiently. The system was also used in a network since it is web-based. Moreover, the user can send the borrower liability report to the accounting department. Hence, the software was rated as very good in terms of reliability. It was also evaluated as very good in terms of accuracy, user-friendliness and efficiency.

<https://ejournals.ph/function/reader1/read2/web/reader.php?id=uploads%2Farchive%2FTIPMRJ%2FVol.+5+No.+1+%282000%29%2FArticles%2F14_Caluya.pdf&di=9084>

Llego, M. A. (2022, August 25). The Importance of Physical Education in Schools. TeacherPH.

https://www.hindawi.com/journals/sp/2022/7126743/#references