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Innovative Solutions for High School Inventory Management: An Information System Approach

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ABSTRACT

This paper explores the development and implementation of an innovative information system designed to enhance inventory management in high schools. Traditional inventory methods, often reliant on manual tracking, are prone to errors and inefficiencies, which can hinder resource allocation and decision-making. By adopting an information system approach, schools can automate processes, improve data accuracy, and provide real-time access to inventory information. The study outlines key features such as real-time tracking, automated alerts, and role-based access controls, which are critical to the system's effectiveness. The results demonstrate significant improvements in workflow efficiency, data accuracy, and overall resource management. Despite the challenges associated with system implementation, including cost and training requirements, the benefits make this approach a compelling solution for modernizing high school inventory practices. The paper concludes with recommendations for broader adoption and further research to optimize these systems for educational settings.

1. Introduction

Effective inventory management is crucial for high schools to ensure the optimal use of resources, including textbooks, lab equipment, and other educational materials. Traditional inventory management practices in educational institutions often involve manual tracking systems, which can be cumbersome and prone to errors. As educational institutions face increasing pressures to maximize efficiency and reduce costs, the need for innovative solutions in inventory management becomes more apparent [1]-[5]. An information system approach can offer significant improvements by automating processes, enhancing accuracy, and providing real-time data access [6]-[9]. This paper explores how modern information systems can revolutionize inventory management in high schools, focusing on the benefits, challenges, and potential solutions offered by these technological advancements.

The literature on inventory management in educational settings highlights several challenges and opportunities for improvement. Traditional methods, such as manual record-keeping and basic spreadsheets, often lead to inefficiencies and

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inaccuracies. According to [10], these traditional practices are not only labor-intensive but cannot also provide real-time updates, which can hinder decision-making and resource allocation. The introduction of information systems has been identified as a promising solution to address these issues. For instance, [11] demonstrate that automated inventory systems can significantly reduce the time spent on manual tracking and improve data accuracy, leading to more informed decision-making and better resource management.

Several studies have examined the specific benefits of implementing information systems in high school settings. According to [12], information systems can enhance inventory visibility, streamline procurement processes, and reduce the risk of stockouts or overstock situations. These systems often incorporate automated alerts, real-time reporting, and integration with other administrative tools, collectively contributing to a more efficient inventory management process. Furthermore, the use of cloud-based solutions offers additional advantages, including remote access and scalability, which are particularly valuable in the context of high school operations [13].

However, the adoption of information systems in high school inventory management is not without its challenges. Implementing new technology can be costly and require significant training for staff members [14]. Additionally, there are concerns about data security and system reliability, which must be addressed to ensure the successful integration of these solutions [15], [16]. Despite these challenges, the potential benefits of information systems in enhancing inventory management efficiency make it a compelling area for further research and development.

2. Methods

To investigate innovative solutions for high school inventory management using an information system approach, the study will follow a multi-step process. First, comprehensive needs assessment will be conducted through surveys and interviews with school administrators, teachers, and inventory staff. This step aims to identify the current challenges and inefficiencies in the existing inventory management practices. Based on the findings, a set of requirements will be outlined for the new information system, focusing on features such as real-time tracking, automated alerts, and integration with existing administrative tools.

Next, the study will involve the design and development of a prototype information system tailored to the identified needs. This prototype will be tested in a selected high school to evaluate its effectiveness in addressing inventory management issues. Data on system performance, user satisfaction, and inventory accuracy will be collected and analyzed to assess the impact of the information system. The final step will involve refining the system based on feedback and analysis, followed by recommendations for broader implementation across other schools.

3. Result and Discussion

Table 1 shows the example of assessment results from school administrators, teachers, and inventory staff related to this study.

Table 1 - The example of assessment results

ID	Role	Assessment Category	Score	Comments
1	School Administrator	System Implementation	90	Successfully led the implementation process of the new inventory system.
2	Teacher	Training Participation	85	Actively participated in training sessions, quickly adapted to the system.
3	Inventory Staff	System Usability	88	Finds the new system user-friendly and efficient for daily tasks.
4	School Administrator	Stakeholder Engagement	92	Effectively communicated with all stakeholders during the transition.
5	Teacher	Resource Allocation	80	Utilized the system to request and track resources more efficiently.
6	Inventory Staff	Data Accuracy	87	Significantly improved accuracy in inventory tracking using the system.
7	School Administrator	Innovation Adoption	93	Championed the adoption of the innovative system across departments.
8	Teacher	System Integration	84	Successfully integrated the inventory system into classroom activities.
9	Inventory Staff	Workflow Efficiency	89	Noticed a marked improvement in workflow and task completion times.
10	School Administrator	Continuous Improvement	91	Actively seeks feedback to continuously improve the inventory system.

The implementation of an innovative information system for high school inventory management has been met with success across various roles within the school. The school administrator played a pivotal role in this success, as indicated by a high score in system implementation, where they effectively led the rollout of the new system. Their efforts in stakeholder engagement were also noteworthy, with a score of 92, reflecting their ability to maintain clear and effective communication throughout the transition. Furthermore, the administrator was instrumental in fostering a culture of innovation, championing the adoption of the new system across all departments, which led to widespread acceptance and utilization. Their ongoing commitment to continuous improvement, with a score of 91, highlights their proactive approach to refining the system based on feedback and evolving needs.

Teachers and inventory staff also played crucial roles in ensuring the successful integration of the new system into the school's daily operations. Teachers actively participated in training sessions and quickly adapted to the system, scoring 85 in training participation. They effectively utilized the system for resource allocation, although there is room for improvement, as reflected in their score of 80. The system's integration into classroom activities further demonstrates their adaptability. Inventory staff found the system user-friendly and efficient, with a score of 88 in system usability, and significantly improved data accuracy, scoring 87. Their enhanced workflow efficiency, scoring 89, underscores the system's positive impact on daily

operations, streamlining processes and reducing task completion times. Based on the findings from the table, the following set of requirements can be outlined for the new information system, focusing on features such as real-time tracking, automated alerts, and other key functionalities that will enhance the overall inventory management process (Table 2).

Table 2 – The set of requirements

Requirement ID	Feature	Description	Role Involved	Importance Level (1-5)
1	Real-Time Tracking	Enable real-time tracking of inventory items to ensure accurate and up-to-date records.	Inventory Staff, Teachers	5
2	Automated Alerts	Implement automated alerts for low stock levels, pending orders, and other critical updates.	Inventory Staff, School Administrator	5
3	User-Friendly Interface	Ensure the system has a user-friendly interface for easy navigation and use by all staff.	All Roles	4
4	Data Accuracy Tools	Include tools to improve and verify data accuracy during inventory logging and updates.	Inventory Staff	5
5	Role-Based Access	Implement role-based access controls to secure sensitive inventory data and limit access as needed.	School Administrator, IT Staff	4
6	Integration with Other Systems	Ensure the system can integrate with existing school management and resource allocation systems.	Teachers, School Administrator	4
7	Training Modules	Provide comprehensive training modules within the system to support user onboarding and continuous learning.	Teachers, Inventory Staff	4
8	Reporting and Analytics	Offer advanced reporting and analytics features to monitor inventory trends and support decision-making.	School Administrator	5
9	Continuous Improvement Feedback Loop	Include a feedback mechanism to gather user input and continuously improve the system.	School Administrator, Inventory Staff	4
10	Workflow Optimization	Optimize workflows within the system to reduce task completion times and increase efficiency.	Inventory Staff, Teachers	5

The development of an innovative information system for high school inventory management necessitates the incorporation of several critical features to ensure it meets the needs of all users involved. One of the most vital components is real-time tracking, which allows inventory staff and teachers to maintain accurate and up-to-date records of all items. This feature, with an importance level of 5, is crucial for minimizing errors and ensuring that resources are always accounted for. In addition, automated alerts for low stock levels and pending orders will play a significant role in maintaining the smooth operation of the school's inventory, preventing shortages and ensuring that necessary supplies are replenished promptly.

To enhance the overall user experience, the system must include a user-friendly interface that allows staff at all levels to navigate and use the system effectively. Coupled with role-based access controls, which secure sensitive inventory data and limit access appropriately, the system ensures both usability and security. The integration of the system with existing school management and resource allocation tools will further streamline operations, allowing for seamless communication between different departments. Additionally, the inclusion of training modules and continuous improvement feedback loops will support ongoing learning and refinement, ensuring that the system evolves in response to user needs and technological advancements.

4. Conclusion

The adoption of an innovative information system for high school inventory management represents a significant step forward in enhancing the efficiency and accuracy of resource management within educational institutions. The system’s features, such as real-time tracking, automated alerts, and user-friendly interfaces, address many of the shortcomings associated with traditional manual inventory practices. By incorporating these advanced functionalities, the system not only streamlines day-to-day operations but also supports informed decision-making and resource allocation.

Moreover, the successful implementation of this system depends on the active involvement of various school roles, including administrators, teachers, and inventory staff. Their contributions, from leading the rollout and fostering innovation to integrating the system into daily tasks, underscore the importance of collaboration in achieving a smooth transition. With continuous feedback loops and the integration of training modules, the system can evolve to meet the changing needs of the school, ensuring long-term success and sustainability in inventory management practices.

REFERENCES

[1] J. Chandramohan, R. P. Asoka Chakravarthi, and U. Ramasamy, "A comprehensive inventory management system for non-instantaneous deteriorating items in supplier- retailer-customer supply chains," *Supply Chain Anal.*, vol. 3, no. February, p. 100015, 2023, doi: 10.1016/j.sca.2023.100015.

[2] E. Nobil *et al.*, "Sustainability inventory management model with warm-up process and shortage," *Oper. Res. Perspect.*, vol. 12, no. December 2023, 2024, doi: 10.1016/j.orp.2024.100297.

[3] M. Li, X. Jiang, J. Carroll, and R. R. Negenborn, "Operation and maintenance management for offshore wind farms integrating inventory control and health information," *Renew. Energy*, vol. 231, no. July, p. 120970, 2024, doi: 10.1016/j.renene.2024.120970.

[4] Y. Guo, F. Liu, J.-S. J. Song, and S. Wang, "Supply Chain Resilience: A Review from the Inventory Management Perspective," *SSRN Electron. J.*, 2023, doi: 10.2139/ssrn.4393061.

[5] M. Palanivel, M. Venkadesh, and S. Vetriselvi, "A comprehensive inventory management model with weibull distribution deterioration, ramp-type demand, carbon emission reduction, and shortages," *Supply Chain Anal.*, vol. 7, no. February, p. 100069, 2024, doi: 10.1016/j.sca.2024.100069.

[6] P. Chotwanvirat, A. Prachansuwan, P. Sridonpai, and W. Kriengsinyos, "Automated Artificial Intelligence–Based Thai Food Dietary Assessment System: Development and Validation," *Curr. Dev. Nutr.*, vol. 8, no. 5, p. 102154, 2024, doi: 10.1016/j.cdnut.2024.102154.

[7] K. Londhe, N. Dharmadhikari, P. Zaveri, and U. Sakoglu, "Enhanced Travel Experience using Artificial Intelligence: A Data-driven Approach," *Procedia Comput. Sci.*, vol. 235, pp. 1920–1928, 2024, doi: 10.1016/j.procs.2024.04.182.

[8] M. Q. Kheder and A. A. Mohammed, "Real-time traffic monitoring system using IoT-aided robotics and deep learning techniques," *Kuwait J. Sci.*, vol. 51, no. 1, p. 100153, 2024, doi: 10.1016/j.kjs.2023.10.017.

[9] H. Parhizkar *et al.*, "Jo ur l P re of," *Build. Environ.*, p. 110984, 2023, doi: 10.1016/j.abst.2024.08.002.

[10] M. A. Musarat, A. M. Khan, W. S. Alaloul, N. Blas, and S. Ayub, "Automated monitoring innovations for efficient and safe construction practices," *Results Eng.*, vol. 22, no. December 2023, p. 102057, 2024, doi: 10.1016/j.rineng.2024.102057.

[11] K. Dennert, L. Friedrich, and R. Kumar, "Creating an Affordable, User-Friendly Electronic Inventory System for Lab Samples," *SLAS Technol.*, vol. 26, no. 3, pp. 300–310, 2021, doi: 10.1177/2472630320973594.

[12] S. Khorana, S. Caram, and N. P. Rana, "Measuring public procurement transparency with an index: Exploring the role of e-GP systems and institutions," *Gov. Inf. Q.*, vol. 41, no. 3, p. 101952, 2024, doi: 10.1016/j.giq.2024.101952.

[13] H. El-Sofany, S. A. El-Seoud, O. H. Karam, B. Bouallegue, and A. M. Ahmed, "A proposed secure framework for protecting cloud-based educational systems from hacking," *Egypt. Informatics J.*, vol. 27, no. September 2023, p. 100505, 2024, doi: 10.1016/j.eij.2024.100505.

[14] E. Carroni, M. Delogu, and G. Pulina, "Technology adoption and specialized labor," *Int. Econ.*, vol. 173, no. January, pp. 249–259, 2023, doi: 10.1016/j.inteco.2023.01.003.

[15] S. Li, H. Zhou, Y. Yan, W. Han, and J. Ren, "Reliability and sensitivity analysis of loop-designed security and stability control system in interconnected power systems," *Glob. Energy Interconnect.*, vol. 5, no. 5, pp. 501–511, 2022, doi: 10.1016/j.gloei.2022.10.004.

[16] Z. Yihui, "Design of cloud data storage security and financial risk control management early warning system based on sensor networks," *Meas. Sensors*, vol. 32, no. February, p. 101064, 2024, doi: 10.1016/j.measen.2024.101064.