UNIVERSITI TEKNOLOGI MARA

LABORATORY CHEMICAL AND EQUIPMENT INVENTORY MANAGEMENT SYSTEM FOR SMK TUNKU KURSHIAH USING NIELSEN'S USABILITY HEURISTICS

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ABSTRACT

The chemical and equipment management in school laboratories requires accurate records, safe monitoring, and clear coordination between teachers and laboratory staff. At SMK Tunku Kurshiah, the previous process depended on manual records, which made it more difficult to monitor chemical stock, expiry dates, damaged equipment, and laboratory booking requests systematically. Therefore, this project aimed to identify the current process and problems in laboratory chemical and equipment inventory management, design and develop LCIMS, and evaluate its functionality and usability. The project was developed using the Adapted Waterfall Model, which involved planning, analysis, design, implementation, testing, and documentation phases. Nielsen's Usability Heuristics were also applied to guide the interface design and evaluate system usability. LCIMS was developed as a web-based system with four user roles, namely System Administrator, Head Laboratory Assistant, Laboratory Assistant, and Teacher. The system supported user management, chemical and equipment records, stock updates, expiry and low stock notifications, damaged equipment tracking, booking management, equipment returns status, stock-out records, and report generation. System testing was conducted through normal, alternative, and exception scenarios to ensure that the main functions worked as expected. In addition, expert testing involved three experts, while user testing involved 31 respondents from the target user group. The evaluation results showed that LCIMS achieved 89.1% for satisfaction, 88.3% for effectiveness, and 88.8% for efficiency. These findings indicated that the system was usable, effective, and efficient in supporting laboratory management tasks. Overall, LCIMS provides a more organised and practical digital solution for SMK Tunku Kurshiah by improving inventory accuracy, booking coordination, chemical monitoring, and equipment tracking. Future enhancement may include item pictures, detailed rack-based inventory viewing, and barcode scanning to make the system more complete.