Inside | Jurnal Sistem Informatika Cerdas .
Volume 2 Nomor 1 | bulan July tahun 2024 | halaman 25-29
e-ISSN: 3031-4860

Development of Science Laboratory Information System (case study: SMA Negeri Grujugan Bondowoso)

Difari Afreyna Fauziah [1*], Agung Muliawan[2]
[1,2]Institute of Technology and Science Mandala, Jember, Country

Corresponding Author:
Difari Afreyna Fauziah, Institute of Technology and Science Mandala, Jember, 68121, Indonesian
Email: difariafreyna@itsm.ac.id

This research aims to develop a science laboratory information system at SMA Negeri Grujugan to improve the efficiency and effectiveness of laboratory management. The science laboratory at this school experiences several obstacles in terms of equipment inventory management, lab schedule management, and recording experimental results. To overcome these problems, this research proposes the creation of a web-based information system that can integrate various important functions in laboratory management. The methodology used in the development of this system includes requirements analysis, system design, implementation, and testing. The test results show that this information system is able to improve recording accuracy and simplify the laboratory administration process, as well as get positive feedback from users. The developed science laboratory information system provides solutions to various existing problems by providing features such as inventory management, practicum scheduling, and reporting of experimental results. With this system, it is expected that the management of science laboratories at SMA Negeri Grujugan will be more structured and efficient, and can improve the quality of science learning at the school.
Keywords : Information System, Science Laboratory, System Development, Laboratory Management

1 INTRODUCTION

Science laboratories play a crucial role in supporting the educational process in secondary schools, by providing facilities for students to carry out experiments and apply the scientific theories they have learnt [1]. However, science laboratory management often faces various challenges that hinder its operational effectiveness and efficiency [2]. At SMA Negeri Grujugan, the current science laboratory management still relies on manual methods, which often cause various obstacles, such as difficulties in inventory management, poorly organised practicum scheduling, and unstructured recording of experimental results [3].

The current manual management method results in several major problems, including inaccurate inventory data, lab scheduling that is often rescheduled, and recording of experimental results that are difficult to access and analyse [4], [5]. These problems result in time wastage, potential loss of equipment, and a lack of optimisation of laboratory usage. Therefore, an information technology-based solution is needed that can effectively address these issues.

This research aims to design and develop a web-based information system for science laboratories at SMA Negeri Grujugan. This system is expected to be able to increase efficiency in inventory management, improve the practicum scheduling process, and facilitate the recording and reporting of experimental results. With this information system, it is expected that laboratory management will become more structured and effective, which in turn can improve the quality of science learning [6] .

The implementation of this science laboratory information system is expected to provide significant benefits for laboratory managers and students [7]. For managers, this system will simplify the process of administration and equipment management, and improve data accuracy [8]. For students, the system will provide better access to laboratory information and experimental results, which can support their learning process [9]. Overall, this research is expected to contribute to improving the quality of laboratory management and the science learning process at SMA Negeri Grujugan.

.

2 RESEARCH METHOD

This research uses a research approach with the waterfall method, which consists of needs analysis, system design, development, and evaluation [1]. This approach was chosen to ensure that the science laboratory information system can be designed and implemented in a systematic and structured manner [10], [11]. The following is an explanation. The following is a picture of the model used in this research:

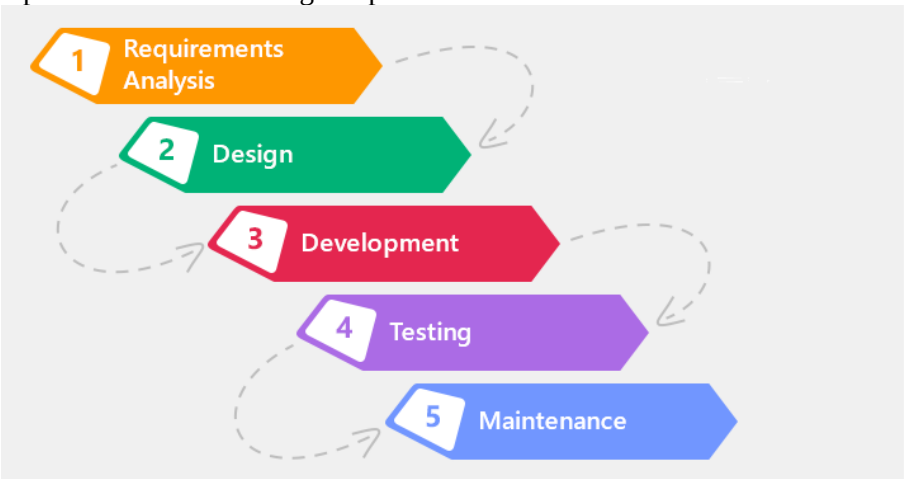


Fig 1. Model Waterfall

2.1 Requirement Analysis

A needs analysis was conducted to identify existing problems and determine the features required in the information system. Data was collected through interviews with laboratory managers and students, as well as direct observation of the ongoing laboratory management process. This analysis also involved a literature study regarding laboratory information systems to understand the best practices that can be applied.

2.2 Design

Based on the results of the needs analysis, the system design was carried out by creating a system architecture model, flow chart, and user interface prototype. This system design includes key modules such as inventory management, lab scheduling, and recording of experimental results. The design tools used include the Unified Modeling Language (UML) for system modelling.

2.3 Development

System development is done using web technologies, including programming languages such as Visual Basic. Net and databases such as MySQL. The development process involves source code generation, module integration, as well as unit testing to ensure each component of the system functions as expected.

2.4 Testing

System testing is conducted in two stages. First, internal system testing to ensure functionality and integration between modules. Second, system trials involving end users (laboratory managers and students) to gather feedback on the ease of use and effectiveness of the system. Evaluation is conducted to assess system performance and make improvements based on the feedback received.

2.5 Implementasi

After testing and improvement, the system was implemented in the science laboratory of SMA Negeri Grujugan. The trial was given to the laboratory manager and students to ensure they could use the system effectively. Technical support was also provided to handle any problems that may arise during the initial period of system use.

3 RESULTS AND ANALYSIS

From the methodology process, the results of the implementation of VB.NET programming are obtained in the form of applications. There are several menus such as the borrowing menu, additions, purchases, suppliers, verification of procurement of goods, Print and inventory. The following is a display of the application produced in this study:

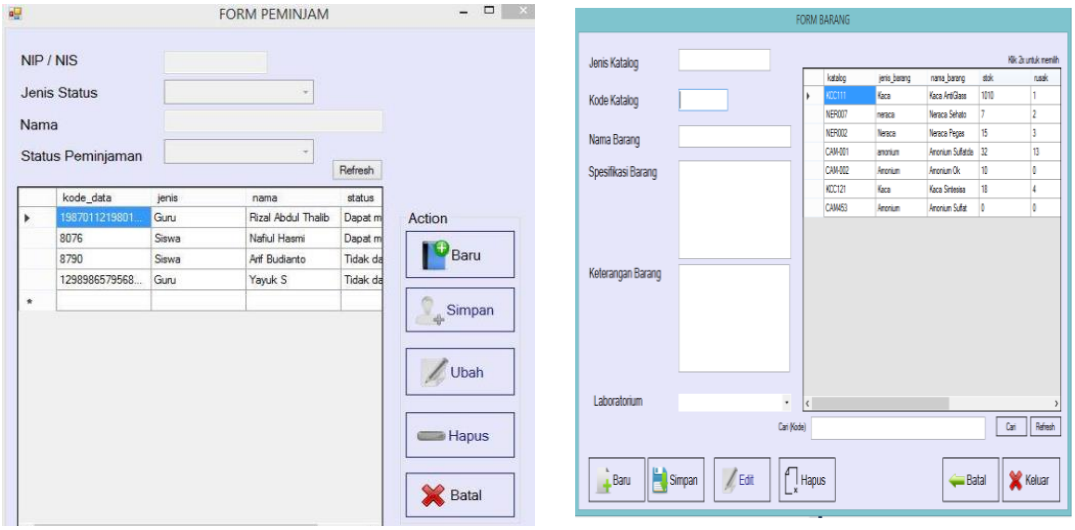


Figure 2. Borrowing & Adds Form

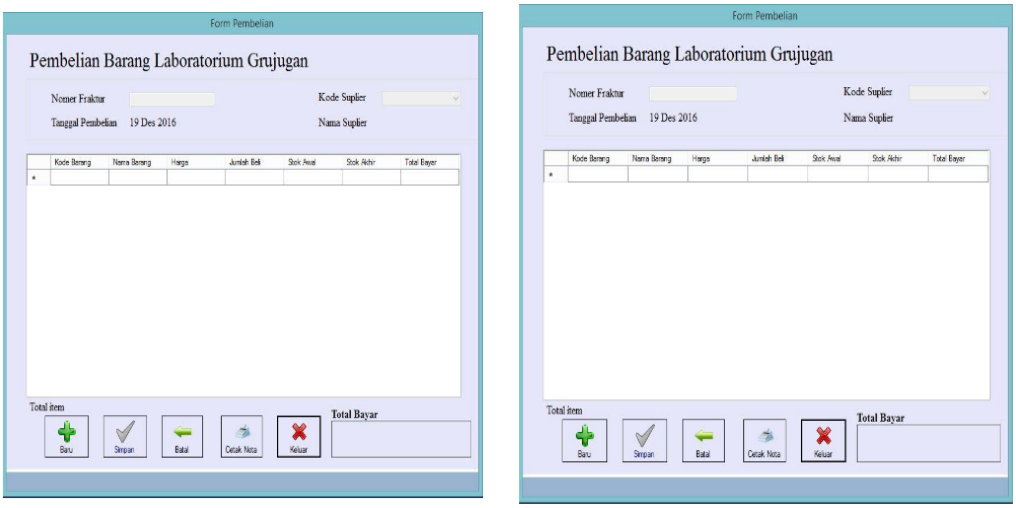
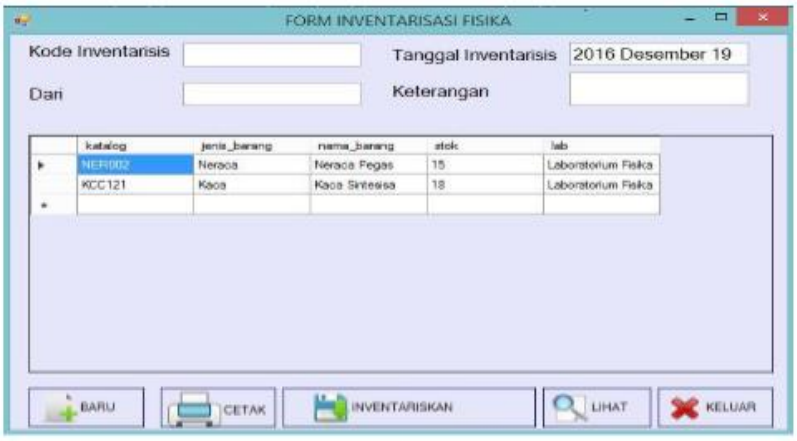
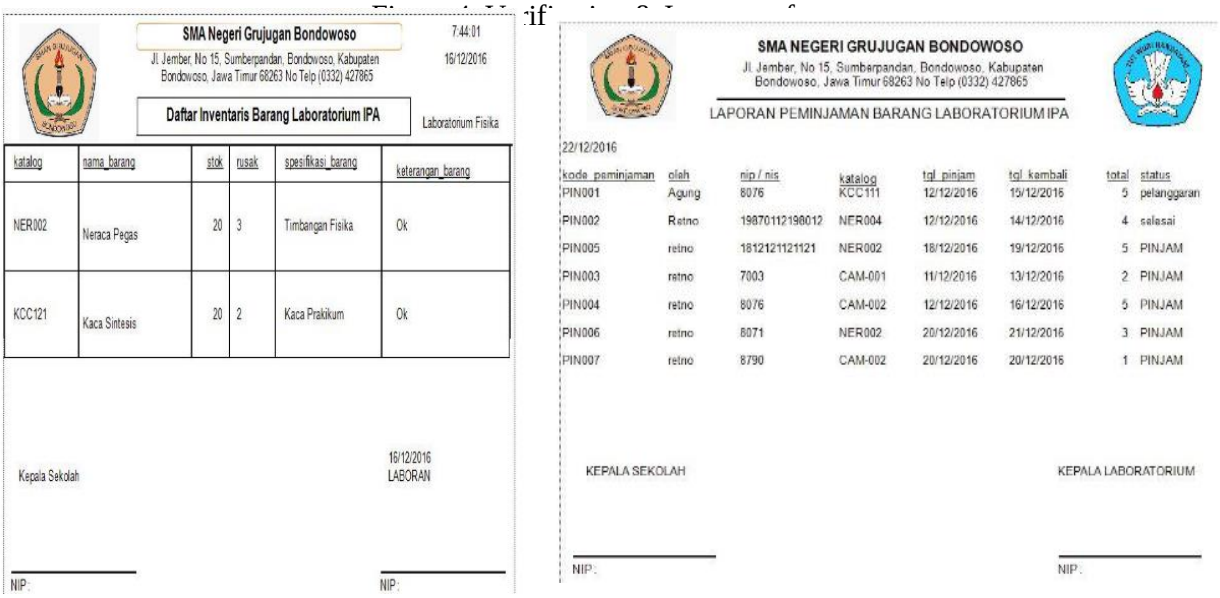


Figure 3. Buying & Suplier Form



.



SMA Negeri Grujugan Bondowoso
Jl. Jember, No 15, Sumberpandan, Bondowoso, Kabupaten Bondowoso, Jawa Timur 68263 No Telp (0332) 427865
7:44:01
16/12/2016

Daftar Inventaris Barang Laboratorium IPA
Laboratorium Fisika

katalog	nama_barang	stok	rusak	spesifikasi_barang	keterangan_barang
NER002	Neraca Pegas	20	3	Timbangan Fisika	Ok
KCC121	Kaca Sintesis	20	2	Kaca Praktikum	Ok

Kepala Sekolah
16/12/2016
LABORAN
NIP:
NIP:

SMA NEGERI GRUJUGAN BONDOWOSO
Jl. Jember, No 15, Sumberpandan, Bondowoso, Kabupaten Bondowoso, Jawa Timur 68263 No Telp (0332) 427865

LAPORAN PEMINJAMAN BARANG LABORATORIUM IPA

22/12/2016

kode_peminjaman	oleh	nip / nis	katalog	tgl_pinjam	tgl_kembali	total	status
PIN001	Agung	8076	KCC111	12/12/2016	15/12/2016	5	pelanggaran
PIN002	Retno	19870112198012	NER004	12/12/2016	14/12/2016	4	selesai
PIN005	retno	1812121121121	NER002	18/12/2016	19/12/2016	5	PINJAM
PIN003	retno	7003	CAM-001	11/12/2016	13/12/2016	2	PINJAM
PIN004	retno	8076	CAM-002	12/12/2016	16/12/2016	5	PINJAM
PIN006	retno	8071	NER002	20/12/2016	21/12/2016	3	PINJAM
PIN007	retno	8790	CAM-002	20/12/2016	20/12/2016	1	PINJAM

KEPALA SEKOLAH
KEPALA LABORATORIUM
NIP:
NIP:

Figure 5. Print Document

4 CONCLUSION

The development of a web-based science laboratory information system at SMA Negeri Grujugan has succeeded in significantly increasing the efficiency and effectiveness of laboratory management. This system improves inventory management, scheduling of practicums, and recording of experimental results, as well as offering better and more accurate access to laboratory data. System testing shows that users, both managers and students, feel the benefits of better organization and reduced administrative burden. Although the results are positive, some aspects of the system still need improvement, including adjustments to features and user interfaces. Overall, this system makes a significant contribution to improving the quality of laboratory management and can be used as a reference for other educational institutions in implementing similar information technology.

REFERENCES

[1] A. Muliawan, D. A. Fauziyah, M. Hermansyah, F. Wiranto, and I. Sabilirrayad, “Implementation and Testing of a Website Based New Student Admission System at Vocational High School Visi Global Jember,” *Prog. Conf.*, vol. 6, no. 1, Art. no. 1, Nov. 2023.

[2] D. A. Fauziah, A. Muliawan, and M. Dimyati, “Measuring Quality of E-learning Websites Using WebQual 4.0 Method in Higher Education (Case Study : Institute Technology and Science Mandala),” - *J. Sist. Inform. Cerdas*, vol. 1, no. 2, Art. no. 2, Dec. 2023.

[3] N. A. Prasetyo, M. Hermansyah, I. Sabilirrasyad, and F. Azim, “Evaluating Individual Involvement in Shaping Information Security Culture,” *PROCEEDING Int. Conf. Econ. Bus. Inf. Technol. ICEBIT*, vol. 4, pp. 861–866, Jul. 2023.

[4] M. Hermansyah, N. A. Prasetyo, A. Muliawan, M. F. Firdausi, and F. Wiranto, “Classification of Student Readiness for Educational Unit Exams: Decision Tree Approach C4.5 Based on Try Out Scores at MTs Nahdlatul Arifin,” *LOREM Comput. Eng. Comput. Inf. Syst.*, vol. 1, no. 1, Art. no. 1, Jan. 2024.

[5] C. Pertiwi and A. Diana, “Aplikasi Sistem Pendukung Keputusan Penilaian Karyawan Terbaik Menggunakan Metode AHP Dan SAW,” *Bit Fak. Teknol. Inf. Univ. Budi Luhur*, vol. 17, no. 1, Art. no. 1, Apr. 2020, doi: 10.36080/bit.v17i1.1000.

[6] A. Muliawan, I. Sabilirrasyad, M. Hermansyah, D. A. Fauziah, and F. Firdausi, “Implementation of Trend Moment Method in Gasoline Stock Forecasting (Case Study : SPBU Rest Area 25 - Sidoarjo),” *LOREM Comput. Eng. Comput. Inf. Syst.*, vol. 1, no. 1, Art. no. 1, Jan. 2024.

[7] I. Sabilirrasyad, M. Hermansyah, A. Muliawan, A. Wahid, and R. Rakhmawati, “Strengthening the Economy and Competitiveness of MSMEs in Jelbuk Village, Jelbuk Sub-District Through MSME Digitization,” *Prog. Conf.*, vol. 6, no. 1, Art. no. 1, Nov. 2023.
[8] F. Wiranto, M. A. Rohim, M. F. Firdausi, A. Muliawan, and E. Afrianto, “Optimizing Coffee Crop Selection for Plant-Ready Coffee Fields: A Study Using the ‘Predict.in’ Decision Support System at the Coffee and Cocoa Research Center in Jember,” *Prog. Conf.*, vol. 6, no. 1, pp. 42–47, Nov. 2023.
[9] D. A. Fauziah, A. Maududie, and I. Nuritha, “Klasifikasi Berita Politik Menggunakan Algoritma K-nearst Neighbor,” *Berk. SAINSTEK*, vol. 6, no. 2, Art. no. 2, Dec. 2018, doi: 10.19184/bst.v6i2.9256.
[10] Y. Amaliah and S. Suprianto, “Sistem Pendukung Keputusan Penerima Beasiswa Tidak Mampu Menggunakan Metode Moora,” *J. Teknol. Inf.*, vol. 5, no. 1, Art. no. 1, Jun. 2021, doi: 10.36294/jurti.v5i1.1704.
[11] N. W. A. Ulandari, “Implementasi Metode MOORA pada Proses Seleksi Beasiswa Bidikmisi di Institut Teknologi dan Bisnis STIKOM Bali,” *Eksplora Inform.*, vol. 10, pp. 53–58, Oct. 2020, doi: 10.30864/eksplora.v10i1.379.