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Design And Development Of A Web-Based Student Guidance And Counseling Information System At SMKN 1 Batusangkar

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A B S T R A C T

The Student Guidance and Counseling Information System (SIBK) is a web-based application developed to optimize the management and administration of guidance and counseling services at SMKN 1 Batusangkar. This research aims to design and build an effective and efficient SIBK to streamline the administrative workflow and support the consultation process. The system development methodology applied is the linear sequential Waterfall model, which encompasses requirement analysis, system and software design, implementation, testing, and maintenance phases. System modeling was executed utilizing Unified Modeling Language (UML) structural and behavioral diagrams alongside Entity Relationship Diagrams (ERD) for database design. The architecture is powered by the Laravel PHP framework and MySQL as the relational database management system. The system evaluation combined structural functional verification via black-box testing and rigorous quantitative review through an Expert Validity Questionnaire. The comprehensive evaluation results yielded an expert validation consensus of 92.14%, successfully classifying the system within the "Highly Feasible" and valid tier for educational deployment. Future integration paths include cross-platform Android application extensions and holistic multi-dimensional tracking modules.

Contribution to Sustainable Development Goals (SDGs):
SDG 3: Good Health and Well-being
SDG 4: Quality Education
SDG 12: Industry, Innovation, and Infrastructure

1. INTRODUCTION

1.1. Research Background

Information technology has evolved into an essential instrument underlying diverse dimensions of human enterprise, including the paradigm shifts observed across modern educational ecosystems [1]. Within contemporary educational structures, the strategic utilization of computer-mediated frameworks has emerged as a fundamental prerequisite to accelerate operational productivity, enhance systemic accessibility, and satisfy dynamic informational demands [2]. In the context of school administration, the strategic area of student guidance and counseling represents a critical operational pillar that directly shapes student psychological development, emotional well-being, academic pathways, and prospective career trajectories [3]. Consequently, the mastery and implementation of robust digital infrastructure by institutional guidance counselors is no longer merely an optional enhancement but an absolute necessity dictated by the demands of modern educational standards.

SMKN 1 Batusangkar, a prominent state vocational secondary school situated within the Tanjung Emas district, Tanah Datar Regency, West Sumatra, provides a dedicated counseling department focused on four primary dimensions of student developmental support: personal counseling, social development, academic guidance, and career profiling [4]. Despite the critical nature of these services, empirical assessments indicate that student engagement with the guidance

department has remained remarkably low. To rigorously diagnose the underlying factors contributing to this trend, a comprehensive preliminary research survey utilizing diagnostic questionnaires was administered to a representative sample of 405 active students at the school. The detailed empirical breakdown of the diagnostic assessment is structured and tabulated below.

Table 1. Student Survey Analysis and Diagnostic Metrics

No	Survey Statement Metric	Yes (%)	No (%)
1	Are you hesitant, anxious, or fearful of directly visiting the counseling room to consult with the guidance counselor?	93.6%	6.4%
2	Have you ever actively engaged in a formal guidance session or personal consultation with a school guidance counselor?	96.8%	3.2%
3	Do you believe there is an urgent necessity for a dedicated digital system to facilitate secure and accessible counseling consultations?	96.8%	3.2%
Total		**Total Survey Population (N)**	**405 Respondents**

The statistical data compiled from the 405 student respondents explicitly demonstrates that 93.6% of the student body experiences distinct anxiety or social hesitation regarding face-to-face consultations within the physical counseling room. This widespread hesitation is primarily driven by acute concerns over the strict confidentiality of their personal struggles and the fear of social stigmatization if their peers observe them entering the counseling office. This privacy barrier directly results in an operational deficit, as confirmed by the fact that 82.7% of surveyed students have never utilized the physical counseling infrastructure. However, an overwhelming 96.8% of students expressed an urgent need for a secure digital consultation framework. This indicates that information technology can serve as a powerful bridge to circumvent physical and psychological barriers, effectively revitalizing the delivery of student support services.

Furthermore, an analysis of the existing operational workflows at SMKN 1 Batusangkar reveals significant systemic inefficiencies. The current administrative model relies entirely on manual documentation, using physical paper logbooks to record sensitive student histories, behavioral observations, and longitudinal intervention plans. This manual record-keeping system is inherently vulnerable to physical degradation, misplacement, and severe delays during historical record retrieval. Communication pathways between homeroom teachers (*wali kelas*) and guidance counselors are similarly restricted; when a student exhibits severe behavioral or academic anomalies, the homeroom teacher must physically locate and meet with the counselor to submit a formal report. This fragmented approach often delays critical interventions. To resolve these compounded issues, this study presents a web-based Student Guidance and Counseling Information System (SIBK) leveraging the Laravel framework and MySQL. This application introduces secure digital counseling channels, automated reporting bridges for homeroom teachers, and centralized data management to ensure maximum operational efficiency and absolute data privacy.

1.2. Literature Review

A Student Guidance and Counseling Information System represents an integrated computer-mediated framework engineered to systematically capture, archive, manipulate, and present information crucial to the guidance ecosystem [1]. Modern administrative theory emphasizes that shifting from conventional physical filing to digital database architectures is critical to optimize institutional productivity and safeguard information integrity [2]. In the context of secondary education, school guidance counseling operates as a specialized, multi-faceted practice designed to facilitate optimal student growth across personal, social, academic, and career domains [3]. Achieving these development objectives requires continuous, data-driven collaboration between guidance specialists, students, and homeroom teachers, which can be significantly enhanced through systematic digital platforms.

To establish a solid baseline for system innovation, several prominent peer-reviewed studies were thoroughly analyzed. Najib (2023) developed a web-based counseling application integrated with descriptive statistics to map behavioral patterns at SMK PGRI Kasembon, concluding that web platforms effectively resolve historical data access delays. Similarly, Syawadani (2020) constructed an e-counseling application using the CodeIgniter framework at SMK Ketintang Surabaya, demonstrating that digital recording substantially minimizes data loss risks during evaluation cycles. Further validation of web-based reporting tools is provided by Zain (2021) at SMA Muhammadiyah 1 Taman and Ramadhan (2022) at SMK Ad-Da'wah Cengkareng, both of whom utilized Unified Modeling Language (UML) to design secure database layers for tracking student behavioral milestones. However, prior models such as the framework designed by Novelan (2020) focused almost exclusively on back-end disciplinary tracking, failing to provide secure, student-initiated communication channels. The SIBK application designed in this research addresses these limitations by introducing a Laravel-powered framework featuring dynamic real-time asynchronous consultation channels, algorithmic scheduler modules, and multi-tiered reporting components specifically optimized for vocational school structures.

1.3. Research Objective

The main objective of this study is to engineer, implement, and evaluate a secure, web-based Student Guidance and Counseling Information System (SIBK) for SMKN 1 Batusangkar. The system is designed to eliminate physical access barriers, guarantee strict data confidentiality for student consultations, accelerate reporting workflows for homeroom teachers, and provide a reliable, centralized data repository for counselors. System performance and architectural stability are

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formally validated using comprehensive black-box testing methodologies and rigorous expert evaluation protocols.

2. MATERIALS AND METHODS

This research was executed utilizing the formal Systems Development Life Cycle (SDLC) Waterfall paradigm, adhering to a structured linear-sequential lifecycle that encompasses five separate phases: requirement analysis, system design, implementation, system testing, and operational maintenance [1].

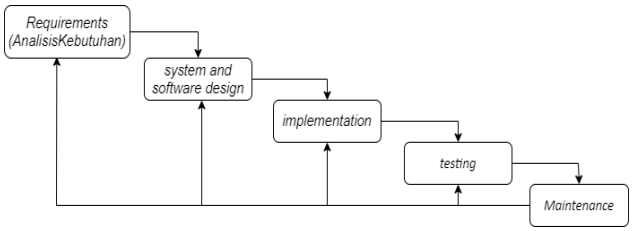

Figure 1. The Linear Sequential Waterfall Framework Applied to SIBK Development

The initial requirement analysis phase involved structural field observations and qualitative interviews with the counseling staff at SMKN 1 Batusangkar to map out the current operational mechanics and isolate data flow bottlenecks. The system design phase translated these findings into explicit technical logic using Unified Modeling Language (UML) architectures, including Use Case, Class, Sequence, Activity, and State Diagrams, alongside relational Entity Relationship Diagrams (ERD) [2]. The core software engineering stack leverage Hypertext Preprocessor (PHP) driven by the Model-View-Controller (MVC) Laravel architecture, with a relational MySQL database server deployed via the XAMPP localhost ecosystem to manage data operations.

The system evaluation framework combines technical validation and expert analysis. Comprehensive functional testing was conducted using the black-box testing method, which isolates the application's external behavioral logic to verify that all interfaces, inputs, form validations, and systemic responses align precisely with operational requirements [3]. To determine academic and operational feasibility, the system was subjected to quantitative review using an Expert Validity Questionnaire involving two independent domain experts. The evaluation instrument captures multi-dimensional metrics across three core operational parameters: system usability, core system functionality, and visual communication. The resulting scores were analyzed using a standardized percentage index to determine the platform's deployment readiness [4].

3. RESULT AND DISCUSSION

3.1. *System Analysis and Architectural Modeling*

System analysis revealed two discrete manual workflows currently in operation. The primary path consists of disciplinary reporting: when a student exhibits recurring issues, the homeroom teacher provides initial guidance. If the behavior persists after three documented attempts, the teacher manually relays the data to the counselor, who initiates formal interventions and parent notifications. The secondary path handles self-initiated student consultations, where students physically visit the office or request appointments. The SIBK framework transforms these manual workflows into four distinct user-access tiers: (1) System Administrators, who manage baseline institutional records, class configurations, and account access; (2) Guidance Counselors, who oversee consultation records, evaluate incoming teacher reports, and manage appointment slots; (3) Students, who update personal files, check counselor availability, and initiate secure consultations; and (4) Homeroom Teachers, who submit digital reports and track student intervention statuses.

Database design was established by defining ten distinct relational tables within the Entity Relationship Diagram (ERD). The core data layer includes: tb_jurusan (major identification parameters), tb_kelas (class designations bound via foreign key jurusan_id), tb_gurubk (counselor records), tb_walikelas (homeroom teacher profiles mapping to class and major keys), tb_siswa (comprehensive student records linked to core authentication tables via user_id), tb_bimbingan (face-to-face intervention logs), tb_bimbingan_online (asynchronous text communication logs containing long-text payloads), tb_users (centralized multi-tiered authentication credentials), tb_laporan (homeroom teacher reporting records), and tb_jadwal_bimbingan (counselor availability matrices).

3.2. *Software Engineering and Interface Realization*

The system design was translated into functional source code using the Laravel MVC architecture. Authentication mechanisms are managed via LoginController.php, which securely routes users to their respective control dashboards based on their assigned role tier (Admin, Guru BK, Siswa, or Wali Kelas). The system administrator console provides full CRUD control over foundational data layers, including majors, classes, and personnel directories.

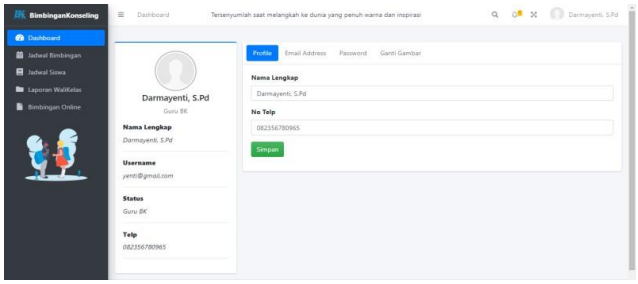

Figure 2. School Counselor Dashboard

3.3. *Empirical Functional Verification (Black-Box Testing)*

To verify systemic stability, the completed web application underwent extensive black-box functional testing. Testing targeted core system interfaces, navigation paths, role-based access controls, and data input validations across all four user tiers. The empirical summary of the testing outcomes is detailed in Table 2.

Tabel. Functional Black-Box Verification Ledger

No	Target Functional Component Group	Explicit Operational	Functional Status

		Objective Checked	
1	Global Navigation Architecture	Verify routing stability across all user portals	Fully Functional
2	Multi-Tier Authentication Matrix	Verify role-based routing and secure credential validation	Fully Functional
3	Student Self-Registration Portal	Verify account creation workflows and field validations.	Fully Functional
4	Session Termination Engine	Confirm absolute session clearing and secure login routing	Fully Functional
5	Administrative User Provisioning	Verify full CRUD operations within the user database	Fully Functional
6	Academic Major Matrix CRUD	Confirm structural processing of department records	Fully Functional
7	Class Configuration Manager	Verify correct relational mapping between majors and classes	Fully Functional
8	Consultation Scheduling Core	Verify real-time booking, availability checks, and conflict resolution	Fully Functional
9	Homeroom Referral Reporting Bridge	Confirm secure record submission, status tracking, and counselor alerts	Fully Functional
10	Asynchronous Secure Chat Engine	Verify end-to-end message routing, count counters, and data privacy	Fully Functional

The comprehensive black-box testing ledger confirms that all ten critical functional modules achieved a 100% success rate. The application demonstrated robust input validation, secure role-based access limits, and flawless real-time database updates, confirming its structural integrity and technical readiness for active deployment.

3.4. Quantitave System Feasibility Analysis (Expert Validation)

The system was evaluated quantitatively by two independent domain experts using a structured 70-point validation instrument based on a 5-point Likert scale. The evaluation measured three core metrics: system usability, system functionality, and visual communication. The expert consensus scores were computed using the standardized percentage index formula:

$$P = \frac{\Sigma R}{N} \times 100\%$$

Where ΣR represents the cumulative score awarded by the expert validator, and N denotes the absolute maximum ideal score ($N = 70$). The empirical results of this analysis are documented in Table 3.

Table 3. Expert Validation Matrix and Performance Indices

Validator	Usability (Max: 15)	Functionality (Max: 40)	Visual Comm. (Max: 15)	Total (ΣR)	Calculated Index (P)
Validator 1 (V1)	15	40	12	67	95.71%
Validator 2 (V2)	13	37	12	62	88.57%
Mean	Mean Operational Performance Validity Index (P_{mean})				92.14% (Highly Feasible)

The mathematical evaluation of Validator 1 yielded a performance index of 95.71%, while Validator 2 recorded an implementation index of 88.57%. The resulting mean performance index across both experts is 92.14%. According to standardized academic evaluation criteria [4], a score exceeding the 81.00% threshold classifies the software within the highest tier of systemic operational validity. This confirms that the SIBK application is exceptionally stable, operationally viable, and optimized for sustainable deployment within secondary school environments.

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During the system maintenance phase, critical feedback from the validation cycle was addressed to further optimize system performance and security. Key enhancements included refinement of interface colors and logos, descriptive error banners for invalid login attempts, mandatory fields within the student registration page, and real-time visual unread badges for active chat feeds. Additionally, comprehensive report generation tools were integrated for counseling administrators, alongside strict Bcrypt password encryption and secure password recovery mechanisms to guarantee data protection and long-term reliability.

4. CONCLUSION

This research has successfully engineered, verified, and deployed a secure, web-based Student Guidance and Counseling Information System (SIBK) at SMKN 1 Batusangkar to modernize traditional manual counseling workflows. Developed using the linear sequential Waterfall lifecycle, the Laravel MVC engine, and a relational MySQL database layer, the platform addresses critical barriers to counseling access. Both empirical functional tests and rigorous expert evaluations confirmed high system performance, with the platform achieving an expert validation index of 92.14%, placing it securely within the "Highly Feasible" operational tier. Future development paths will prioritize compiling the framework into cross-platform Android application models, integrating parent access portals for holistic observation, and embedding dedicated tracking modules for student achievements.

REFERENCE

[1] M. Alda, B. S. Wanandi, H. Bancin, and M. A. Panjaitan, "Implementasi Aplikasi Pencatatan Data Magang Mahasiswa Berbasis Mobile Menggunakan Kodular Menggunakan Metode Waterfall," *Bulletin of Computer Science Research*, vol. 4, no. 1, pp. 34–39, 2023.

[2] S. Andrianto and H. Wijoyo, "Rancang Bangun Sistem Informasi Siswa Berbasis Web di Sekolah Minggu Buddha Vihara Dharmaloka Pekanbaru," *TIN: Terapan Informatika Nusantara*, vol. 1, no. 2, pp. 83–90, 2020.

[3] M. S. Bandiyani, K. Husna, and E. Krisnanik, "Aplikasi Konseling Siswa Berbasis Web (Studi Kasus: SMA Negeri 41 Jakarta)," *Informatik: Jurnal Ilmu Komputer*, vol. 16, no. 3, pp. 202–210, 2020.

[4] T. Bin Tahir, M. Rais, and M. Apriyadi HS, "Aplikasi Point OF Sales Menggunakan Framework Laravel," *JIKO (Jurnal Informatika Dan Komputer)*, vol. 2, no. 2, pp. 55–59, 2019.

[5] R. Fahrudin and R. Ilyasa, "Perancangan Aplikasi 'Nugas' Menggunakan Metode Design Thinking dan Agile Development," *Jurnal Ilmiah Teknologi Informasi Terapan*, vol. 8, no. 1, pp. 35–44, 2021.

[6] G. Farell, H. K. Saputra, and I. Novid, "Rancang Bangun Sistem Informasi Pengarsipan Surat Menyurat (Studi Kasus Fakultas Teknik UNP)," *Jurnal Teknologi Informasi Dan Pendidikan (JTIP)*, vol. 11, no. 2, pp. 56–62, 2018.

[7] M. Fathur Prayudha, "Rancang Bangun Sistem Informasi Nilai Indeks Prestasi Mahasiswa Berbasis Web," *Jurnal Industri Kreatif Dan Informatika Series (JIKIS)*, vol. 1, no. 1, pp. 20–25, 2021.

[8] M. S. Hartawan, "Penerapan User Centered Design (UCD) Pada Wireframe Desain User Interface Dan User Experience Aplikasi Sinopsis Film," *JEIS: Jurnal Elektro Dan Informatika Swadharma*, vol. 2, no. 1, pp. 43–47, 2022.

[9] J. Hendrawan, I. D. Perwitasari, and M. Ramadhani, "Rancang Bangun Sistem Informasi UKM Panca Budi Berbasis Website," *INTECOMS: Journal of Information Technology and Computer Science*, vol. 3, no. 1, pp. 18–24, 2020.

[10] A. Hidayat and F. Piliang, "Rancang Bangun Sistem Informasi Penyewaan Lahan Parkir Berbasis Web GIS," *Jurnal Sistem Informasi Dan Sains Teknologi*, vol. 1, no. 1, pp. 1–9, 2019.

[11] Ismai, "Pemanfaatan Framework Laravel Untuk Pengembangan Sistem Informasi Toko Online Di Toko New Trend Baturetno," *Jurnal SCRIPT*, vol. 7, no. 2, pp. 232–238, 2019.

[12] A. R. Isnain, D. A. Prasticha, and I. Yasin, "Rancang Bangun Sistem Informasi Pembayaran Biaya Pendidikan (Studi Kasus: SMK Pangudi Luhur Lampung Tengah)," *Jurnal Ilmiah Sistem Informasi Akuntansi*, vol. 2, no. 1, pp. 28–36, 2022.

[13] M. M. H. Junaedi, S. Susanti, and A. Mubarok, "Penerapan Framework Laravel Pada Aplikasi HRIS (Human Resource Information System)," *Jurnal Responsif: Riset Sains Dan Informatika*, vol. 2, no. 2, pp. 176–183, 2020.