International Journal of Innovative Research and Scientific Studies, 9(6) 2026, pages: 1-9

IJIRSS
International Journal of Innovative Research & Scientific Studies

ISSN: 2617-6548

URL: www.ijirss.com

Designing an integrated counseling service through WhatsApp bot and physical space: A design science research approach at Islamic State University of Sumatera Utara

Ummi Khairun Niswah[1*], Taufiq Sitompul[2], Richard Holman Matanta[3], Yona May Rahayu[4]

[1]*Faculty of Public Health, Universitas Islam Negeri Sumatera Utara, Medan, Indonesia.*
[2]*Computer Science Department, BINUS Graduate Program - Doctor of Computer Science, Bina Nusantara University, Jakarta, Indonesia.*
[3]*Faculty of Medicine, Universitas Hasanuddin, Makassar, Indonesia.*
[4]*School of Humanities, Faculty of Digital Technology, Communication, and Education, University of Manchester, Manchester, UK.*

Corresponding author: Ummi Khairun Niswah (*Email: ummikhairunniswah@uinsu.ac.id*)

Abstract

This study addresses the persistent underutilization of counseling and academic guidance services among university students at the Faculty of Public Health (FKM), Universitas Islam Negeri Sumatera Utara (UINSU), Indonesia. It aims to systematically design, develop, demonstrate, and evaluate an integrated counseling service artifact—combining a physical counseling space (MIKA Corner) with a WhatsApp-based chatbot (MIKA Care)—to improve service accessibility and reduce stigma barriers to ultimately enhance student well-being. The study employs Design Science Research (DSR) methodology following the process model by Peffers, et al. [1] operationalized through five iterative stages: (1) problem identification and motivation, (2) definition of solution objectives, (3) design and development, (4) demonstration, and (5) evaluation. The research is further grounded in Hevner, et al. [2] three-cycle framework (relevance, design, and rigor cycles). Data were gathered through stakeholder consultations, observational analysis, student feedback surveys (Likert-scale and open-ended), and platform usage analytics over a 30-day implementation period. The evaluation employed a mixed-methods approach guided by the Framework for Evaluation in Design Science Research (FEDS) by Venable, et al. [3]. The MIKA artifact successfully served 64 students (3 via face-to-face counseling at MIKA Corner; 61 via MIKA Care WhatsApp Bot). Student satisfaction ratings averaged 4.83/5.0 for ease of use, 4.83/5.0 for information relevance, and 4.60/5.0 for helpfulness. Qualitative feedback confirmed stigma reduction and improved accessibility. The digital channel's dominance (95.3% of users) demonstrates the chatbot's effectiveness as a low-barrier gateway to professional academic counseling. The integrated physical-digital counseling artifact effectively addressed barriers to counseling utilization in an Indonesian Islamic university context. The DSR methodology provided a rigorous framework for systematic service innovation. Design principles, including dual-channel delivery, de-stigmatized environments, and familiar-platform integration, are transferable to similar higher education contexts. Universities in developing countries can adopt the MIKA model as a scalable, low-cost approach to improving student support services. The WhatsApp-based chatbot infrastructure requires minimal technical investment while achieving significant reach. The design principles and DSR framework offer a replicable methodology for similar service innovation projects.

Keywords: Design science research, Higher education innovation, Indonesia, Service design artifact, Student mental health, University counseling, WhatsApp chatbot.

DOI: 10.53894/ijirss.v9i6.11704
Funding: This study received no specific financial support.
History: Received: 11 March 2026 / **Revised:** 8 May 2026 / **Accepted:** 13 May 2026 / **Published:** 25 May 2026
Copyright: © 2026 by the authors. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).
Competing Interests: The authors declare that they have no competing interests.
Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.
Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.
Acknowledgments: The author gratefully acknowledges the support of Dr. Nursapia Harahap, MA (Mentor), Dr. Hj. Rahma Evady Tanjung, S.Ag., M.Si (Coach), Nurul Hamifa Saragih, M.Psi., Psikolog (Faculty Psychologist), the FKM UINSU administration, and the Balai Diklat Keagamaan Medan for facilitating this research as part of the Pelatihan Dasar CPNS 2025 program.
Publisher: Innovative Research Publishing

1. Introduction

The mental health and academic well-being of university students have become pressing global concerns. Research from the World Health Organization's World Mental Health International College Student (WMH-ICS) project indicates that approximately one-third of first-year university students worldwide meet criteria for at least one mental health disorder, yet fewer than one in five receive adequate treatment [4, 5]. This treatment gap is particularly acute in low- and middle-income countries, where institutional counseling resources are often limited and cultural barriers to help-seeking are more pronounced [6, 7].

In Indonesia, the challenge is compounded by persistent cultural stigma surrounding mental health, a shortage of trained counselors within higher education institutions, and a general prioritization of academic over psychosocial support [8, 9]. Islamic universities face additional considerations, as counseling approaches must be perceived as aligned with religious values and the cultural expectations of the student population [10]. Observational analysis at the Faculty of Public Health (FKM), Universitas Islam Negeri Sumatera Utara (UINSU), confirmed these broader patterns: despite documented student needs for academic guidance and psychological support, existing counseling services were significantly underutilized.

Meanwhile, the rapid digital transformation in higher education has opened new avenues for addressing access barriers. Chatbot technologies, particularly those integrated with widely-used messaging platforms such as WhatsApp, have demonstrated promise in delivering mental health information, triaging student concerns, and facilitating appointment scheduling across diverse contexts [11-13]. In South Korea, Kim, et al. [14] demonstrated that AI social chatbots can significantly reduce loneliness and social anxiety among university students. In the United Kingdom, Fitzpatrick, et al. [15] showed that a conversational agent delivering cognitive-behavioral therapy (CBT) achieved meaningful symptom reduction among young adults. In Ghana, Essel, et al. [16] found that educational chatbots significantly improved learning performance in a university context. However, research on the systematic design and evaluation of integrated counseling artifacts that combine digital chatbot interfaces with physical counseling spaces remains scarce, particularly in developing country contexts.

To address this gap, the present study applies Design Science Research (DSR) methodology—a rigorous problem-solving paradigm originating from information systems research [1, 2]—to develop and evaluate MIKA (Mitra Konseling Akademik), an integrated counseling service artifact deployed at FKM UINSU. MIKA comprises two interlinked components: MIKA Corner, a redesigned physical counseling space creating a welcoming, stigma-free environment; and MIKA Care, a WhatsApp-based chatbot providing information, appointment booking, preliminary psychological screening, and counselor connection.

1.1. Research Questions

The following research questions guide this study:

1. RQ1: How can an integrated physical-digital counseling artifact be systematically designed using DSR methodology to address counseling service underutilization at an Indonesian Islamic university?
2. RQ2: To what extent does the developed artifact improve counseling service accessibility and utilization among university students?
3. RQ3: What are the user satisfaction levels and perceived impact of the integrated counseling artifact on stigma reduction and academic support?
4. RQ4: What transferable design principles can be derived from the DSR process for replication in similar higher education contexts?

1.2. Contributions

The contributions of this study are fourfold. First, it demonstrates the application of DSR methodology, grounded in Hevner, et al. [2] three-cycle framework and Peffers, et al. [1] process model, in university counseling service innovation—a domain where DSR remains underutilized. Second, it provides empirical evidence on WhatsApp-based chatbots as low-

barrier entry points to professional counseling. Third, it extends the evidence base beyond Western contexts by situating the intervention within an Indonesian Islamic university. Fourth, it yields transferable design principles for dual-channel student support service design in developing countries.

2. Literature Review

2.1. Student Counseling in Higher Education: Global and Indonesian Perspectives

University counseling services are essential to supporting students through academic pressures, social transitions, and psychological challenges [17, 18]. Systematic evidence demonstrates that access to counseling is associated with improved academic outcomes, higher retention rates, and enhanced well-being [19, 20]. However, persistent barriers impede utilization globally, including stigma, lack of awareness, scheduling constraints, and perceptions of services as inaccessible [21, 22].

International research has documented these barriers across diverse contexts. In Ethiopia, Getachew [6] found through qualitative research that counseling centers in higher education are critical but underutilized due to awareness gaps and institutional neglect. In South Africa, Herselman and Botha [23] applied DSR approaches to develop technology-mediated support interventions for educational settings. In Iran, Dehrashid, et al. [24] identified significant gaps between student counseling needs and available services at universities. These patterns are amplified in the Indonesian context by cultural norms discouraging open mental health discussion, limited counselor availability, and prioritization of academic over psychosocial support [7-9]. Islamic universities face the additional consideration of ensuring that counseling aligns with religious values [10].

2.2. Digital Interventions and Chatbots in Student Support Services

Digital mental health interventions have gained considerable traction, driven by advances in artificial intelligence and mobile communication ubiquity [25-27]. Chatbots have been explored as scalable tools for psychoeducation, initial assessments, and on-demand student support [11, 15]. Several empirical studies demonstrate their effectiveness:

Fitzpatrick, et al. [15] in the United States, conducted a randomized controlled trial demonstrating that Woebot, a conversational agent delivering CBT, significantly reduced depression symptoms among young adults over two weeks. Kim, et al. [14] in South Korea, employed a quasi-experimental design showing that four weeks of interaction with an AI social chatbot ("Luda Lee") significantly reduced loneliness and social anxiety among university students. Essel, et al. [16] in Ghana, found that chatbot-mediated support significantly improved learning performance in a technology-oriented university setting. Koulouri, et al. [12] in the United Kingdom, explored chatbot acceptability for mental health support among young adults, finding generally positive reception but emphasizing the importance of user-centered design.

WhatsApp has emerged as particularly promising for educational and health communication in developing countries due to its high penetration, end-to-end encryption, and familiar interface [13, 28]. Research documents WhatsApp's use for peer learning, faculty-student communication, and administrative support [29]. However, the application of WhatsApp-based chatbots specifically for counseling service delivery in higher education represents an emerging area, with limited studies in non-Western contexts.

2.3. Design Science Research: Theoretical Foundations

Design Science Research (DSR) is a problem-solving paradigm that creates and evaluates innovative artifacts to address identified organizational or social problems [2, 30]. DSR is distinguished from behavioral science by its focus on "what can be" rather than "what is"—creating new possibilities through purposeful artifact design March and Smith [31] and Gregor and Hevner [32].

Hevner, et al. [2] established the foundational framework for DSR in information systems, articulating seven guidelines: design as artifact, problem relevance, design evaluation, research contributions, research rigor, design as a search process, and communication of research. Their three-cycle model—comprising the relevance cycle (connecting to the application context), the design cycle (iterative build-evaluate), and the rigor cycle (grounding in the knowledge base)—provides a comprehensive structure for DSR projects.

Peffers, et al. [1] synthesized prior DSR literature into a widely-adopted process model comprising six activities: problem identification and motivation, definition of objectives for a solution, design and development, demonstration, evaluation, and communication. This model has been applied across diverse domains including healthcare [33, 34] education [35, 36] and public service innovation Teixeira, et al. [37].

Venable, et al. [3] contributed the Framework for Evaluation in Design Science Research (FEDS), which provides systematic guidance for planning and conducting DSR evaluations. FEDS distinguishes between formative evaluations (improving the artifact during development) and summative evaluations (assessing final artifact performance), and between artificial evaluations (controlled settings) and naturalistic evaluations (real-world settings). Baskerville, et al. [38] further refined understanding of DSR contributions, arguing for a balance between artifact and theory contributions.

More recently, Vom Brocke, et al. [39] proposed the DSR grid as a tool for planning and communicating DSR projects, while Drechsler and Hevner [40] mapped knowledge paths in DSR, distinguishing between problem-space knowledge, solution-space knowledge, and evaluation knowledge. Iivari [41] critically examined the role of theory in DSR, arguing that while kernel theories can inform design, DSR need not always produce mid-range theory to be valuable. These developments provide a rich methodological foundation for the current study.

2.4. DSR Applications in Education and Healthcare: International Cases

The application of DSR in education and healthcare has expanded significantly in recent years. In Australia, Gregor and Hevner [32] demonstrated how to position and present DSR for maximum impact in organizational contexts. In South Africa, Herselman and Botha [23] applied DSR as a methodology for technology-enhanced educational interventions in post-graduate research. In Finland, Teixeira, et al. [37] advanced service design research by integrating DSR principles for the development of new service artifacts. In the healthcare domain, Mustafee [34] used participatory design research following DSR principles to develop real-time simulation models for emergency departments in the United Kingdom.

However, DSR applications specifically targeting academic counseling service innovation remain limited. Most existing counseling technology research employs experimental or survey-based methodologies rather than the systematic artifact-creation approach offered by DSR. This study contributes to filling this gap by demonstrating how DSR can structure the entire lifecycle of counseling service innovation—from problem identification through design, demonstration, and evaluation.

3. Methodology

3.1. Research Design and Framework

This study adopts Design Science Research (DSR) as its primary research methodology. DSR was selected for its emphasis on creating practical, innovative artifacts that address real-world problems while contributing to the knowledge base through rigorous design and evaluation [1, 2]. The research follows the process model by Peffers, et al. [1] operationalized within the three-cycle framework of Hevner, et al. [2].

- Relevance Cycle: Connecting the research to the application context at FKM UINSU, identifying requirements from stakeholder consultations and observational analysis, and establishing acceptance criteria for artifact evaluation.
- Design Cycle: Iteratively building and evaluating the MIKA artifact through five DSR process stages, incorporating stakeholder feedback at each iteration.
- Rigor Cycle: Grounding the design in the existing knowledge base (counseling theory, chatbot design literature, DSR methodology) and contributing new knowledge through design principles and empirical findings.

The evaluation component is guided by the FEDS framework [3] employing naturalistic summative evaluation through real-world deployment and user feedback collection. Figure 1 presents the conceptual mapping of the research framework.

The study was conducted at FKM UINSU, Medan, Indonesia, over a 30-day implementation period from August 7 to September 11, 2025. Table 1 summarizes the DSR stages, activities, outputs, and evaluation criteria.

Table 1.
DSR Process Model: Stages, Activities, Outputs, and Evaluation Criteria.

DSR Stage	Key Activities	Outputs/Artifacts	Evaluation Criteria
1. Problem Identification & Motivation	Observational analysis; stakeholder interviews (dean, psychologist, students); systematic literature review on counseling underutilization	Validated problem statement; stakeholder needs assessment; documentation of barriers (stigma, awareness, access)	Relevance to stakeholders; consistency with literature; clarity of problem articulation
2. Objectives of a Solution	Define Design-Relevant Requirements (DRR); establish measurable success criteria; concept document development	5 Design-Relevant Requirements (DRR1–DRR5); MIKA concept document (vision, mission, service typology); success metrics	Alignment with needs; feasibility; stakeholder validation; internal consistency
3. Design & Development	Physical space redesign; WhatsApp Bot development (ManyChat); content creation; functional testing; iterative refinement	MIKA Corner (furnished counseling room); MIKA Care (WhatsApp Bot with 6 features); counseling materials (print/digital); user flow diagrams	Functional completeness; usability; DRR alignment; technical reliability
4. Demonstration	Socialization event (n=30); multi-channel promotion (social media, broadcast messaging); pilot counseling sessions	Event documentation; user registration data; session reports; usage analytics; broadcast reach data	Reach; uptake rate; participant engagement; transition from digital to face-to-face
5. Evaluation	Feedback surveys (Likert-scale + open-ended); usage data analysis; thematic analysis of qualitative responses; monitoring report	Satisfaction scores; usage statistics (n=64); qualitative themes; design principles; improvement recommendations	User satisfaction (≥4.0/5.0); perceived usefulness; accessibility improvement; stigma reduction evidence

3.2. Stage 1: Problem Identification and Motivation

The relevance cycle began with systematic problem identification through multiple data sources. Observational analysis at FKM UINSU revealed that existing counseling and academic guidance services were significantly underutilized despite documented student needs. Semi-structured consultations with the faculty dean (serving as project mentor), a faculty psychologist (Nurul Hamifa Saragih, M.Psi., Psikolog), and administrative staff confirmed multiple barriers: limited student awareness, counseling-related stigma, absence of digital service channels, and scheduling rigidity.

A targeted literature review of counseling utilization in Indonesian and comparable developing-country universities further contextualized these findings, establishing consistency with patterns reported by Lubis and Sari [8]; Suryani, et al. [7] and Getachew [6]. The output was a validated problem statement and comprehensive needs assessment.

3.3. Stage 2: Definition of Objectives for a Solution

Based on the problem analysis, five Design-Relevant Requirements (DRR) were formulated:

1. DRR1 (Dual-Channel Access): The artifact must provide counseling through both physical and digital channels to accommodate diverse student preferences and escalation needs.
2. DRR2 (Stigma Reduction): The physical space must minimize perceived stigma through welcoming, non-clinical design that creates psychological safety.
3. DRR3 (Platform Familiarity): The digital component must leverage a platform already embedded in students' daily communication practices (WhatsApp), requiring minimal technical proficiency.
4. DRR4 (Data-Driven Monitoring): The system must enable structured utilization data collection for monitoring, evaluation, and continuous improvement.
5. DRR5 (Cultural-Institutional Alignment): The artifact must align with Islamic values and the institutional mission of FKM UINSU, ensuring cultural appropriateness.

These DRRs were validated through consultation with the faculty mentor and psychologist. A concept document specifying MIKA's vision, mission, and service typology was developed as the primary output.

3.4. Stage 3: Design and Development

3.4.1. MIKA Corner (Physical Artifact)

The physical counseling space was established within an existing room (Puskesma) at FKM UINSU. The design followed DRR2 (stigma reduction) by replacing clinical-style furniture with comfortable seating (sofa, armchairs), ambient lighting (standing lamps), decorative elements (wall art, artificial plants), and privacy-enhancing features. This approach aligns with Nordberg, et al. [18] recommendations that counseling environments significantly influence help-seeking willingness. Coordination with administrative staff (Tata Usaha) and facilities teams (Cleaning Service) ensured institutional approval and logistical support. A feedback QR code was installed for immediate post-session evaluation (DRR4).

3.4.2. MIKA Care (Digital Artifact)

The WhatsApp chatbot was developed using ManyChat, a no-code chatbot development platform enabling automated conversational flow creation. The development process comprised:

- Content architecture: Detailed conversational flows were mapped including user verification (enrollment confirmation), main menu navigation, and response scripts for six core modules: (a) MIKA information, (b) appointment scheduling (integrated with Google Calendar), (c) Hamilton Depression Rating Scale screening, (d) FAQ section, (e) feedback collection, and (f) direct counselor connection (academic and psychological).
- Development and testing: The bot was programmed collaboratively with a developer team through iterative sprints. Functional testing identified issues with counselor type selection and text formatting, which were resolved through subsequent iterations. Coordination with the developer team occurred via Google Meet sessions (DRR4).
- Content creation: Supplementary counseling materials were designed, including infographics on stress management, study tips, and thesis writing guidance, available both physically and digitally through MIKA Care (DRR5).

3.5. Stage 4: Demonstration

The demonstration involved multi-channel deployment. A formal socialization event was held at the FKM auditorium (n=30 students from Public Health and Nutrition programs), featuring a live demonstration of MIKA Care's features. Promotion was extended through Instagram and TikTok (@mikacare.fkm) and targeted WhatsApp broadcast messages to students in semesters 7 and above (including those exceeding the standard 8-semester duration). MIKA Corner operated Monday–Thursday, 10:00–16:00, while MIKA Care operated continuously.

3.6. Stage 5: Evaluation

Evaluation employed a mixed-methods approach following naturalistic summative evaluation principles [3]. Two feedback instruments were administered: one for MIKA Corner users and one for MIKA Care users. Quantitative items used 5-point Likert scales measuring ease of use, information relevance, helpfulness, and stigma reduction. Open-ended items captured qualitative experiences and improvement suggestions. Usage data were extracted from ManyChat analytics and session logs. Thematic analysis [42] was applied to open-ended responses.

4. Results

4.1. Artifact Description

The DSR process produced two integrated artifact components. MIKA Corner is a redesigned physical counseling space located in the Puskesma room at FKM UINSU, featuring comfortable informal furniture, ambient lighting, decorative elements, and privacy features. MIKA Care is a WhatsApp chatbot built on ManyChat, accessible via a dedicated phone number, featuring six modules: information, appointment scheduling, psychological stress screening, FAQ, feedback, and counselor connection.

4.2. Usage Analytics (RQ2)

Over the 30-day implementation period, 64 unique students utilized MIKA services. Table 2 presents the distribution.

Table 2.
Service Utilization Summary.

Service Channel	Users (n)	Percentage
MIKA Care (WhatsApp Bot)	61	95.3%
MIKA Corner (Face-to-Face)	3	4.7%
Total	64	100%

Among MIKA Care users, the most accessed features included information browsing, stress screening, FAQ consultation, and appointment scheduling. Several digital users subsequently transitioned to direct counselor interaction via chat, voice call, or face-to-face sessions. Broadcast campaigns reached students across cohorts 2016–2021, with delivery rates of 73–93% and read rates of 55–65%.

4.3. User Satisfaction (RQ3)

Table 3.
MIKA Care User Satisfaction Scores (n=6)

Evaluation Dimension	Mean (1–5)
Ease of use (menu/features)	4.83
Information relevance and usefulness	4.83
Helpfulness (academic/personal issues)	4.60
Comfort and stigma reduction	4.80

MIKA Corner users (n=3) rated room comfort and privacy at 4.67/5.0, counselor professionalism at 5.0/5.0, and overall helpfulness at 5.0/5.0. Counseling sessions addressed specific challenges including supervisor replacement procedures, time management strategies, and thesis topic identification.

4.4. Qualitative Feedback Themes (RQ3)

Thematic analysis of open-ended responses identified four themes:

1. Privacy and psychological safety: Users emphasized that both channels maintained confidentiality. Digital interactions were praised for enabling disclosure without face-to-face pressure.
2. Accessibility and convenience: The WhatsApp interface was consistently praised for enabling access without visiting a physical location or navigating complex institutional processes.
3. Tangible academic impact: Students reported concrete outcomes: assistance with administrative procedures (supervisor replacement letters), stress coping strategies, and academic planning guidance.
4. Improvement suggestions: Recommendations centered on expanding promotion, increasing scheduling flexibility, and integrating AI-driven instant response capabilities.

4.5. Design Principles Derived (RQ4)

The DSR process yielded five transferable design principles:

Table 4.
Transferable Design Principles from the MIKA Artifact

No.	Design Principle	Description	Supporting Evidence
DP1	Dual-Channel Complementarity	Provide both digital (low-barrier entry) and physical (deep engagement) channels as an integrated service continuum	95.3% digital vs. 4.7% physical usage; digital-to-physical escalation observed
DP2	De-Stigmatized Physical Environment	Design counseling spaces with non-clinical, homely aesthetics to reduce psychological barriers	4.67/5.0 comfort rating; positive qualitative feedback on atmosphere
DP3	Familiar Platform Integration	Embed counseling services within platforms already used daily by the target population	4.83/5.0 ease of use; 61 users via WhatsApp within 30 days
DP4	Progressive Engagement Pathway	Design the digital interface as a gateway that enables graduated transition from anonymous browsing to direct counselor contact	Users progressed from info browsing → screening → scheduling → counselor contact
DP5	Feedback-Driven Iteration	Embed continuous feedback mechanisms and iterate artifact design based on user input	Counselor selection and calendar integration added based on user/testing feedback

5. Discussion

5.1. The Chatbot as a Low-Barrier Gateway (RQ1, RQ2)

The most striking finding is the pronounced preference for the digital channel (95.3%). This aligns with international evidence that technology-mediated entry points effectively lower help-seeking barriers [11, 14, 26]. The WhatsApp chatbot functioned not merely as an information tool but as a progressive gateway: students could browse information anonymously, complete self-screening, and then decide whether to engage with a counselor—all within a familiar communication environment.

This gateway function addresses the well-documented "help-seeking gap" where students needing support are reluctant to initiate formal contact [21, 22]. By embedding counseling access within WhatsApp—a platform used daily by Indonesian students—MIKA Care effectively reduced the psychological distance between students and support services. This finding extends the work of Koulouri, et al. [12] and Fitzpatrick, et al. [15] by demonstrating this principle in a non-Western, Islamic university context where cultural barriers are particularly salient.

Comparatively, the results echo findings from Ghana [16] where chatbot-mediated educational support proved effective in a developing-country university context, and from South Korea [14] where chatbot interactions reduced social anxiety. The MIKA case adds to this evidence base by demonstrating effectiveness specifically for counseling service access facilitation, rather than direct therapeutic intervention.

5.2. DSR as a Methodology for Counseling Service Innovation (RQ1)

This study demonstrates DSR's viability for developing service innovations in higher education. The five-stage process model [1] grounded in Hevner, et al. [2] three-cycle framework, provided systematic structure for moving from problem identification through design, demonstration, and evaluation. The relevance cycle ensured that the artifact addressed genuine stakeholder needs; the design cycle enabled iterative refinement based on testing and feedback; and the rigor cycle grounded design decisions in counseling theory and chatbot design literature.

The iterative refinements observed—adding counselor selection functionality and Google Calendar integration based on testing feedback—illustrate the DSR emphasis on design evolution through use [2, 38]. This is consistent with Venable, et al. [3]. FEDS framework, where formative evaluations during development lead to artifact improvement before summative evaluation. The approach addresses critiques of educational innovation projects lacking methodological rigor [35] and demonstrates that DSR can structure interventions in domains where it has been underutilized.

5.3. Integrated Design Principles (RQ4)

The five design principles derived Table 4 represent this study's primary knowledge contribution, following Gregor and Hevner [32] guidance on maximizing DSR impact through generalizable knowledge. DP1 (Dual-Channel Complementarity) addresses a gap in existing chatbot research, which tends to focus on either digital or physical interventions in isolation. The finding that the physical space remained essential for complex counseling needs (e.g., navigating institutional procedures) while the digital channel served as the primary entry point echoes blended intervention research suggesting purely digital approaches are insufficient for comprehensive student support [26].

DP3 (Familiar Platform Integration) has particular implications for developing countries. Rather than developing custom mobile applications requiring separate download and adoption, leveraging an existing platform (WhatsApp) eliminated a significant adoption barrier. This principle aligns with Tamil Selvan and Kalaiyarasan [13] systematic review finding that WhatsApp's ubiquity in education contexts makes it a uniquely effective delivery platform. DP4 (Progressive Engagement Pathway) represents a novel contribution, conceptualizing the chatbot as a graduated pathway from passive

information consumption to active counselor engagement—a design pattern not previously articulated in the counseling chatbot literature.

5.4. Limitations and Future Research Directions

Several limitations warrant acknowledgment. First, the 30-day implementation period limits assessment of long-term sustainability and outcome effects. Longitudinal studies should track whether initial engagement translates into sustained utilization and measurable improvements in well-being and academic performance. Second, the evaluation sample is small (n=3 face-to-face; n=6 digital survey respondents), limiting generalizability. Future iterations should employ larger samples and control group comparisons.

Third, the current chatbot uses rule-based flows without AI capabilities. Students expressed interest in AI-powered instant responses—a finding consistent with rapidly evolving expectations shaped by generative AI tools [43]. Future research should explore LLM-based conversational AI integration while carefully managing ethical considerations. Fourth, the single-institution design limits external validity. Multi-site replication across different Indonesian university types (secular, Islamic, private, public) would strengthen the evidence base.

Fifth, the absence of baseline utilization data means that claims about improved accessibility cannot be empirically verified. Future studies should establish baseline counseling utilization rates before artifact deployment and employ quasi-experimental designs to enable pre-post comparison about artifact effectiveness. Future studies should incorporate baseline measurements and quasi-experimental designs. Despite these limitations, the study provides a rigorous DSR-based foundation for iterative improvement and replication.

6. Conclusion

This study applied Design Science Research methodology to systematically design, develop, demonstrate, and evaluate MIKA—an integrated counseling service artifact combining a physical counseling space (MIKA Corner) with a WhatsApp-based chatbot (MIKA Care)—at the Faculty of Public Health, UIN Sumatera Utara. Addressing the four research questions, the study demonstrates that: (RQ1) DSR provides an effective methodological framework for counseling service innovation; (RQ2) the artifact showed promising initial reach, with 64 students accessing services within a 30-day pilot period with the digital channel accounting for 95.3% of utilization; (RQ3) user satisfaction was high across all dimensions (mean scores 4.60–4.83/5.0), with qualitative evidence confirming stigma reduction and tangible academic impact; and (RQ4) five transferable design principles were derived for replication in similar contexts.

The study contributes to DSR methodology application in higher education, extends evidence on chatbot-mediated counseling access beyond Western contexts, and offers a practical, low-cost model for universities in developing countries seeking to improve student support services through technology-mediated innovation.

References

[1] K. Peffers, T. Tuunanen, M. A. Rothenberger, and S. Chatterjee, "A design science research methodology for information systems research," *Journal of Management Information Systems*, vol. 24, no. 3, pp. 45-77, 2007, https://doi.org/10.2753/MIS0742-1222240302.

[2] A. R. Hevner, S. T. March, J. Park, and S. Ram, "Design science in information systems research," *MIS Quarterly*, vol. 28, no. 1, pp. 75–105, 2004.

[3] J. Venable, J. Pries-Heje, and R. Baskerville, "FEDS: A framework for evaluation in design science research," *European Journal of Information Systems*, vol. 25, no. 1, pp. 77-89, 2016, https://doi.org/10.1057/ejis.2014.36.

[4] R. P. Auerbach *et al.*, "WHO world mental health surveys international college student project: Prevalence and distribution of mental disorders," *Journal of Abnormal Psychology*, vol. 127, no. 7, p. 623, 2018.

[5] P. Cuijpers *et al.*, "The world health organization world mental health international college student initiative: An overview," *International Journal of Methods in Psychiatric Research*, vol. 28, no. 2, p. e1761, 2019, https://doi.org/10.1002/mpr.1761.

[6] A. Getachew, "Assessment of guidance and counselling service centre in higher education institutions: A qualitative research," *Int J Sch Cogn Psychol*, vol. 7, no. 2, pp. 1-6, 2020.

[7] E. Suryani, A. H. Joesoef, and D. Prasetyo, "Cultural barriers to mental health help-seeking among Indonesian university students," *International Journal of Mental Health Systems*, vol. 15, p. 72, 2021.

[8] H. Lubis and R. M. Sari, "Barriers to mental health service utilization among Indonesian university students: A qualitative exploration," *Asian Journal of Psychiatry*, vol. 54, p. 102385, 2020.

[9] S. Yusuf, N. Harahap, and F. Siregar, "Perceived need and utilization of psychological services among students in North Sumatera," *Journal of Educational Psychology and Counseling*, vol. 6, no. 1, pp. 34–48, 2020.

[10] A. Rofiq, "Islamic counseling model for Muslim students in Indonesian universities: An integrative framework," *Journal of Muslim Mental Health*, vol. 16, no. 2, pp. 45–62, 2022.

[11] E. M. Boucher *et al.*, "Artificially intelligent chatbots in digital mental health interventions: A review," *Expert review of Medical Devices*, vol. 18, no. sup1, pp. 37-49, 2021, https://doi.org/10.1080/17434440.2021.2013200.

[12] T. Koulouri, R. D. Macredie, and D. Olakitan, "Chatbots to support young adults' mental health: An exploratory study of acceptability," *ACM Transactions on Interactive Intelligent Systems*, vol. 12, no. 2, pp. 1-39, 2022, https://doi.org/10.1145/3485874.

[13] P. Tamil Selvan and G. Kalaiyarasan, "Systematic review on utilization of WhatsApp in education," *E-Learning and Digital Media*, vol. 21, no. 4, pp. 389–412, 2024.

[14] M. Kim *et al.*, "Therapeutic potential of social chatbots in alleviating loneliness and social anxiety: Quasi-experimental mixed methods study," *Journal of Medical Internet Research*, vol. 27, p. e65589, 2025, https://doi.org/10.2196/65589.

[15] K. K. Fitzpatrick, A. Darcy, and M. Vierhile, "Delivering cognitive behavior therapy to young adults with symptoms of depression and anxiety using a fully automated conversational agent (Woebot): A randomized controlled trial," *JMIR Mental Health*, vol. 4, no. 2, p. e7785, 2017, https://doi.org/10.2196/mental.7785.

[16] H. B. Essel, D. Vlachopoulos, A. Tachie-Menson, E. E. Johnson, and P. K. Baah, "The impact of a virtual teaching assistant (chatbot) on students' learning in Ghanaian higher education," *International Journal of Educational Technology in Higher Education*, vol. 19, no. 1, p. 57, 2022, https://doi.org/10.1186/s41239-022-00362-6

[17] J. L. Brunner, D. L. Wallace, L. S. Reymann, J.-J. Sellers, and A. G. McCabe, "College counseling today: Contemporary students and how counseling centers meet their needs," *Journal of College Student Psychotherapy*, vol. 28, no. 4, pp. 257-324, 2014, https://doi.org/10.1080/87568225.2014.948770.

[18] S. S. Nordberg, S. Spierling, and L. McVey, "Beyond the therapy room: Strategies for reaching students who avoid counseling centers," *Journal of College Student Psychotherapy*, vol. 36, no. 4, pp. 315–330, 2022.

[19] J. Lee, E. Kim, and A. Wachholtz, "The impact of campus mental health support services on student retention and academic success," *Journal of College Student Retention: Research, Theory & Practice*, vol. 25, no. 3, pp. 456–478, 2023.

[20] A. J. Schwartz, J. Ruzek, S. L. Jones, and P. J. Barr, "University counseling center effectiveness: A comprehensive review," *Professional Psychology: Research and Practice*, vol. 54, no. 2, pp. 112–128, 2023.

[21] D. Eisenberg, J. Hunt, N. Speer, and K. Zivin, "Mental health service utilization among college students in the United States," *The Journal of Nervous and Mental Disease*, vol. 199, no. 5, pp. 301-308, 2011, https://doi.org/10.1097/NMD.0b013e3182175123.

[22] J. Hunt and D. Eisenberg, "Mental health problems and help-seeking behavior among college students," *Journal of Adolescent Health*, vol. 46, no. 1, pp. 3-10, 2010, https://doi.org/10.1016/j.jadohealth.2009.08.008.

[23] M. Herselman and A. Botha, "Applying design science research as a methodology in post graduate studies: A South African perspective," in *Proceedings of the Conference of the South African Institute of Computer Scientists and Information Technologists (pp. 251–258)*, 2020.

[24] F. A. Dehrashid, J. Salimi, and O. Isanejad, "Evaluation of counseling services at student counseling centers in universities under the supervision of the ministry of science, research, and technology," *International Journal of Education and Cognitive Sciences*, vol. 6, no. 2, pp. 1-7, 2025.

[25] E. G. Lattie, E. C. Adkins, N. Winquist, C. Stiles-Shields, Q. E. Wafford, and A. K. Graham, "Digital mental health interventions for depression, anxiety, and enhancement of psychological well-being among college students: Systematic review," *Journal of Medical Internet Research*, vol. 21, no. 7, p. e12869, 2019, https://doi.org/10.2196/12869.

[26] E. G. Lattie, C. Stiles-Shields, and A. K. Graham, "An overview of and recommendations for more accessible digital mental health services," *Nature Reviews Psychology*, vol. 1, no. 2, pp. 87-100, 2022, https://doi.org/10.1038/s44159-021-00003-1.

[27] J. Linardon, "Can acceptance, mindfulness, and self-compassion be learned by smartphone apps? A systematic and meta-analytic review of randomized controlled trials," *Behavior Therapy*, vol. 51, no. 4, pp. 646-658, 2020, https://doi.org/10.1016/j.beth.2019.10.002.

[28] W. M. Al-Rahmi *et al.*, "Use of e-learning by university students in Malaysian higher educational institutions: A case in Universiti Teknologi Malaysia," *IEEE Access*, vol. 6, pp. 14268-14276, 2018, https://doi.org/10.1109/ACCESS.2018.2802325.

[29] S. S. Alqahtani, A. A. Rajkhan, and B. Dey, "Mobile learning in the Saudi Arabian higher education context: A systematic review," *International Journal of Educational Technology in Higher Education*, vol. 16, no. 1, pp. 1–18, 2019.

[30] H. A. Simon, *The sciences of the artificial*. Cambridge, MA: MIT Press, 1996.

[31] S. T. March and G. F. Smith, "Design and natural science research on information technology," *Decision Support Systems*, vol. 15, no. 4, pp. 251-266, 1995, https://doi.org/10.1016/0167-9236(94)00041-2.

[32] S. Gregor and A. R. Hevner, "Positioning and presenting design science research for maximum impact1," *MIS Quarterly*, vol. 37, no. 2, pp. 337-355, 2013, https://doi.org/10.25300/MISQ/2013/37.2.01.

[33] S. J. Miah, H. Q. Vu, and J. Gammack, "A design science research approach to building health analytics decision support systems," *Journal of Decision Systems*, vol. 31, no. sup1, pp. 68–81, 2022.

[34] N. Mustafee, "Participatory design research for the development of real-time simulation models in healthcare," *Journal of the Operational Research Society*, vol. 75, no. 1, pp. 1–20, 2024.

[35] S. McKenney and T. C. Reeves, *Conducting educational design research*. New York: Routledge, 2019.

[36] N. H. Thuan and P. Antunes, "Positioning design science as an educational tool for innovation and problem solving," *Communications of the Association for Information Systems*, vol. 51, no. 1, p. 1, 2022, https://doi.org/10.17705/1CAIS.05120.

[37] J. G. Teixeira, L. Patrício, and T. Tuunanen, "Advancing service design research with design science research," *Journal of Service Management*, vol. 30, no. 5, pp. 577-592, 2019, https://doi.org/10.1108/JOSM-05-2019-0131.

[38] R. Baskerville, A. Baiyere, S. Gregor, A. Hevner, and M. Rossi, "Design science research contributions: Finding a balance between artifact and theory," *Journal of the Association for Information Systems*, vol. 19, no. 5, p. 3, 2018.

[39] J. Vom Brocke, A. Hevner, and A. Maedche, *Introduction to design science research. In J. vom Brocke, A. Hevner, & A. Maedche (Eds.), Design science research cases* Cham, Switzerland: Springer, 2020.

[40] A. Drechsler and A. Hevner, "Knowledge paths in design science research," *Foundations and Trends in Information Systems*, vol. 6, no. 3, pp. 171–243, 2022.

[41] J. Iivari, "A critical look at theories in design science research," *Journal of the Association for Information Systems*, vol. 21, no. 3, p. 10, 2020, https://doi.org/10.17705/1jais.00610.

[42] V. Braun and V. Clarke, "Using thematic analysis in psychology," *Qualitative Research in Psychology*, vol. 3, no. 2, pp. 77-101, 2006, https://doi.org/10.1191/1478088706qp063oa.

[43] M. Abbas, F. A. Jam, and T. I. Khan, "Is it harmful or helpful? Examining the causes and consequences of generative AI usage among university students," *International Journal of Educational Technology in Higher Education*, vol. 21, no. 1, p. 10, 2024, https://doi.org/10.1186/s41239-024-00444-7.