

## Laboratory Management System as a Micro Research Hub in Higher Education

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**ABSTRACT:** *This study develops a religious laboratory management system to transform traditional practicum-based laboratories into micro-research hubs that support research-based learning in Islamic higher education. It bridges the gap between current laboratory practice and the need for collaborative research that integrates lecturers, students, and external partners. Focusing on laboratories in the Faculty of Sharia and Law and the Faculty of Tarbiyah and Teacher Training at UIN Sunan Ampel Surabaya, it formulates a management model to boost research productivity and academic collaboration. This research uses a qualitative case study approach, drawing on data from institutional documents, educational statistics, and interviews with laboratory managers, lecturers, and students. Data collection involved document analysis, semi-structured interviews, and limited observation. This study uses thematic analysis to integrate laboratory management theory, collaboration and co-creation frameworks, and Islamic epistemology, and validates the data through source triangulation and document verification. The study identifies three pillars of an effective laboratory management system: a digital ecosystem via SaTePrada for research and laboratory management, structured collaboration with external institutions for authentic data and professional feedback, and accountable governance through standard operating procedures, performance indicators, and research mentoring. Together, these components enable laboratories to operate as micro-research hubs, strengthening student engagement and a collaborative academic culture. The study is limited to laboratories within two faculties of a single institution. This research introduces an integrated model that connects laboratory management systems with micro-research hubs to strengthen research ecosystems in Islamic higher education.*

Penelitian ini mengembangkan sistem manajemen laboratorium keagamaan untuk mentransformasi laboratorium berbasis praktikum tradisional menjadi pusat riset mikro yang mendukung pembelajaran berbasis penelitian di perguruan tinggi Islam. Kajian ini menjembatani kesenjangan antara praktik laboratorium yang ada dan kebutuhan akan riset kolaboratif yang mengintegrasikan dosen, mahasiswa, serta mitra eksternal. Dengan berfokus pada laboratorium di Fakultas Syariah dan Hukum serta Fakultas Tarbiyah dan Keguruan di UIN Sunan Ampel Surabaya, penelitian ini merumuskan model manajemen yang bertujuan meningkatkan produktivitas riset dan

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kolaborasi akademik. Penelitian ini menggunakan pendekatan studi kasus kualitatif dengan memanfaatkan data yang bersumber dari dokumen kelembagaan, statistik pendidikan, serta wawancara dengan pengelola laboratorium, dosen, dan mahasiswa. Pengumpulan data dilakukan melalui analisis dokumen, wawancara semi-terstruktur, serta observasi terbatas. Analisis tematik digunakan dengan mengintegrasikan teori manajemen laboratorium, kerangka kolaborasi co-creation, serta perspektif epistemologi Islam. Keabsahan data dijamin melalui triangulasi sumber dan verifikasi dokumen. Penelitian ini mengidentifikasi tiga pilar utama sistem manajemen laboratorium yang efektif, yaitu: 1) pengembangan ekosistem digital melalui platform SaTePrada untuk pengelolaan riset dan laboratorium; 2) kolaborasi terstruktur dengan lembaga eksternal guna menyediakan data autentik dan umpan balik profesional; serta 3) tata kelola yang akuntabel melalui standar operasional prosedur, indikator kinerja, dan pendampingan riset. Ketiga komponen tersebut memungkinkan laboratorium berfungsi sebagai pusat riset mikro yang memperkuat keterlibatan mahasiswa serta budaya akademik kolaboratif. Penelitian ini terbatas pada laboratorium di dua fakultas dalam satu institusi. Penelitian ini menawarkan model terintegrasi yang menghubungkan sistem manajemen laboratorium dengan pusat riset mikro guna memperkuat ekosistem penelitian di perguruan tinggi Islam.

**Keywords:** *Digital Transformation of Laboratories, Micro Research Hub, Institutional Co-Creation, Interdisciplinary Epistemology, Data-Driven Governance.*

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## I. INTRODUCTION

The accelerating pace of digital transformation in Indonesia provides a highly strategic momentum for Islamic higher education institutions—such as UIN Sunan Ampel Surabaya—to redefine the functional role of religious laboratories. According to the 2023 Education Statistics published by Statistics Indonesia (*Badan Pusat Statistik/BPS*), the availability of adequate infrastructure remains a significant challenge across many educational units (BPSI, 2023). Conversely, a survey by the Indonesian Internet Service Providers Association (*Asosiasi Penyelenggara Jasa Internet Indonesia/APJII*) reports that household internet penetration in Indonesia has reached a remarkably high level, standing at 78.19 per cent in 2023—equivalent to approximately 215,626,156 individuals out of a total population of 275,773,901 (APJII, 2023). These figures indicate a substantial opportunity to digitise laboratory ecosystems, whether through management platforms or research database systems. Within this framework, laboratories such as the Computer Laboratory, the Center for Constitutional and Legislative Studies, and the Fiqhuna Center at the Faculty of Sharia and Law (*Fakultas Syariah dan Hukum/FSH*), as well as the Integrated Computer Laboratory, Microteaching Laboratory, Mathematics Laboratory, and Language Laboratory at the Faculty of Education and Teacher Training (*Fakultas Tarbiyah dan Keguruan/FTK*), can be further optimised as micro research hubs.

The collaboration between laboratory infrastructure, lecturers, and students constitutes a key element in strengthening the functional role of laboratories within higher

education institutions. Studies on research infrastructure emphasise that laboratories are not merely physical facilities but also institutional environments that support knowledge production, experimentation, and collaborative inquiry. In this context, Muhammad Arif notes that the Faculty of Sharia and Law requires specialised facilities such as a Legislative Studies Center and the Fiqhuna Center to facilitate constitutional studies, contemporary *fiqh* analysis, and text-based Islamic scholarship (Arif, 2025). Comparable needs also appear in the Faculty of Tarbiyah and Teacher Training, where micro-teaching studios and integrated computer laboratories are necessary to support pedagogical training and methodological practice among prospective educators.

From the perspective of higher education research ecosystems, digital platforms can function as integrative tools that connect laboratory resources with academic users. The SaTePrada (Sunan Ampel Teaching Practice Database Application) platform, for instance, is designed to support the management of laboratory activities by providing a digital repository, facility reservation system, teaching practice assessment platform, and monitoring tools for the progress of novice researchers (UINSA, 2022). Such integration aligns with broader international literature that highlights the importance of digital infrastructure and collaborative laboratory environments in strengthening research capacity and academic innovation in universities. In this framework, laboratories can function not only as practicum spaces but also as institutional nodes that facilitate structured research activities and collaborative knowledge development.

According to Alexander Barus, institutional innovation in higher education laboratories cannot rely solely on internal initiatives but requires co-creation with external stakeholders (Barus, 2025). In the international literature, co-creation refers to collaborative processes in which universities, public institutions, and professional actors jointly produce knowledge, policy insights, and practical solutions. This concept is widely discussed within the fields of Innovation Management, Public Policy collaboration, and Knowledge Co-production, where research laboratories function as platforms that connect academic inquiry with real-world institutional practice. Within this framework, partnerships between universities and public institutions provide access to empirical materials such as policy data, judicial decisions, and governance practices. In the Indonesian context, potential collaborators include the Judicial Commission of Indonesia, the House of Representatives of Indonesia, its regional counterparts, and the Supreme Court of Indonesia. These institutions hold valuable resources that can support research in Islamic law, constitutional studies, and contemporary *fiqh*. Previous collaborations between universities and such bodies—for example, through ethics clinics, internships, or judicial research programs—demonstrate how laboratory-based research can engage with policy institutions (Arif, 2025). At UIN Sunan Ampel Surabaya, this collaborative model can be developed through units such as the Center for Constitutional and Legislative Studies and the Fiqhuna Center, enabling the analysis of legislative processes, judicial decisions, and contemporary *sharī'ah*-related policies. In this configuration, laboratories function as analytical hubs that facilitate knowledge exchange between academics and policy institutions (Zainiyati, 2025). Digital platforms such as SaTePrada can further support this process by documenting collaborative activities, managing research data, and producing institutionally verifiable reports.

One of the strategic objectives in strengthening the laboratory is the development of a micro research hub. In this study, a micro research hub is defined as a laboratory-based academic unit that facilitates small-scale, collaborative research activities for early-stage researchers. Support is provided through structured mentoring, shared resources,

and digital research management. Within this framework, laboratories serve not only as practicum facilities but also as institutional platforms for the early stages of scholarly inquiry. This approach is particularly relevant for students and junior faculty, who often show strong research motivation but have limited access to research infrastructure and methodological guidance.

Building on this framework, religious studies laboratories such as the Fiqhuna Center support this function in several ways. They provide collections of classical Islamic texts, including manuscripts and traditional treatises. In addition, they offer digital text-analysis tools, such as text-mining software and applications for *isnād* analysis. The faculty provides micro-teaching studios with audio-visual facilities for recording and evaluating instructional practices and organises early-stage research activities through a structured laboratory-based research clinic under its supervision. Furthermore, the SaTePrada platform supports the process by functioning as a documentation and monitoring system for laboratory-based research. Through this integrated model, students can produce working papers, participate in academic forums, and gradually develop scholarly competencies within a guided, collaborative research environment.

To ensure that laboratory activities support sustainable and high-quality research, higher education institutions require a religious laboratory management system, understood as an integrated framework that regulates planning, access, supervision, documentation, and evaluation of research activities within laboratory environments. In this context, a management system refers to a structured set of procedures, digital tools, and governance mechanisms that coordinate laboratory infrastructure, academic users, and research outputs. Such a system generally operates through a formal workflow that includes topic registration, facility access management, tiered academic supervision, and documentation of research outcomes (Hadi et al., 2023). Within this framework, laboratories in the Faculty of Sharia and Law and the Faculty of Tarbiyah and Teacher Training at UIN Sunan Ampel Surabaya require clear operational standards to ensure effective management. These include Standard Operating Procedures for equipment use, scheduling, and maintenance protocols, as well as measurable performance indicators such as facility utilisation rates, the number of research proposals, and scholarly outputs. To support the operationalisation of this system, a digital platform such as SaTePrada can function as a supporting research management tool. The platform facilitates laboratory reservations, proposal documentation, supervision tracking, and archiving of research outputs, including articles and instructional modules. By integrating governance procedures and digital management tools, laboratories can function as coordinated research hubs that support interdisciplinary inquiry, including interactions between Islamic legal studies and Islamic pedagogy, within a transparent and accountable institutional framework (Nasabella et al., 2023).

Beyond opportunities and institutional models, the transition toward a micro research hub also requires a robust epistemological framework: laboratories must function as spaces of dialectical engagement between theory, practice, and social reality. Analyses in Islamic jurisprudence or constitutional studies are not confined to the classroom; they are tested through legislative simulations, real-case investigations, and collaborative dialogues with external partners such as regional parliaments or the Judicial Commission. Within the Faculty of Education and Teacher Training, micro-teaching students do not merely practice teaching in a laboratory setting; they also engage in self-reflection and empirical inquiry into their own pedagogical methods, which are systematically documented in SaTePrada (Zainiyati, 2025). Such an approach cultivates

a mode of Muslim scientific reasoning that remains inseparable from social context, policy environments, and technological dynamics. The integration of faculties (FSH and FTK) within a micro research hub opens new avenues for interdisciplinary scholarship—for instance, examining how Islamic legal policies shape Islamic educational practices, or analysing micro-teaching through the epistemic lens of Islamic educational jurisprudence.

Effective laboratory governance is pivotal to ensuring that the transformation process proceeds both efficiently and sustainably (Prabowo & Suprajogo, 2025). Good governance entails evidence-based budget planning, systematic maintenance management of laboratory facilities, and a robust monitoring system for laboratory utilisation. Given that BPS data in the Educational Support Statistics 2024 indicate substantial variations in the allocation and condition of facilities across regions, institutions such as UIN Sunan Ampel must formulate internal budgeting policies that are responsive to the specific needs of faculties and academic programs (BPSI, 2025). The integration of SaTePrada into the governance system facilitates automated documentation of equipment loans, damage reporting, and real-time monitoring of facility usage. Through such a governance model, laboratories evolve from merely being spaces “used” for academic activities into strategic decision-making hubs grounded in data-driven transparency.

Moreover, tangible challenges such as limited budgets and shortages of qualified laboratory personnel cannot be overlooked. According to Indonesia's Information and Communication Technology Development Index (ICT Development Index) for 2023, as reported by Statistics Indonesia, national performance reached 5.90 on a 0–10 scale, marking a 0.05-point increase from 5.85 in 2022. This achievement is constructed through three core components: access and infrastructure, usage, and ICT skills. Among these sub-indices, ICT usage accounts for the largest share of the overall index 40.09% indicating increasingly intensive technological penetration across societal and institutional activities. The access and infrastructure component accounts for 39.42% and reflects improvements in network availability and the provision of digital hardware. Meanwhile, the ICT skills sub-index accounts for 20.49%, signalling growth in human resource capacity to utilise technology, although its share remains relatively smaller than those of the other two components (Rafli, 2024; Widyantoro et al., 2024).

These figures illustrate that while internet access continues to expand, the availability of local hardware (computers) remains severely limited nationwide, posing a significant barrier to the development of digital laboratories within universities. In institutional practice, many regional campuses face financial constraints in procuring hardware and experience shortages of competent laboratory technicians. As a mitigation strategy, numerous universities have partnered with non-governmental organisations (NGOs), research institutions, or corporate entities that provide ICT equipment through grant schemes; however, such mechanisms require formalisation through co-creation frameworks and institutional policy integration. This study examines policy recommendations to strengthen laboratory human resource capacity and develop long-term budgeting strategies to enable laboratories to evolve into sustainable micro research hubs.

By integrating analyses of official statistical data, documented cases of real-world collaboration, and technology-driven managerial models such as SaTePrada, this study aims to formulate strategic recommendations for strengthening religious laboratories

within educational institutions. From an institutional policy perspective, the findings can serve as a roadmap for developing laboratory infrastructure as both an interdisciplinary research center and a learning hub. Academically, laboratories managed as micro research hubs will enhance the research productivity of faculty members and students, reinforce collaborative ecosystems, and strengthen the relevance of Islamic scholarship to public policy (S. Li et al., 2020). Socially, collaboration with external partners such as the Judicial Commission, Regional Legislative Councils, and the Supreme Court will amplify the university's contribution to institutional dynamics and regulatory development in Indonesia. Consequently, the transformation of laboratory management is not merely a technical initiative, but an epistemic and institutional strategy designed to address the challenges and opportunities of the digital era in Islamic higher education.

## II. METHOD

This study adopts a qualitative case study design to examine institutional practices at UIN Sunan Ampel Surabaya. The research found that religious laboratories in both the Faculty of Sharia and Law (FSH) and the Faculty of Education and Teacher Training (FTK) exhibit the potential to be transformed into micro research hubs through changes in laboratory procedures and governance models. These findings reveal that contextual factors and institutional operations play a critical role in this transformation within the university. The analysis finds that integrating laboratory infrastructure, fostering internal external collaboration, and utilising digital platforms such as SaTePrada contribute to revitalising laboratories and promoting research-based learning. The case study reveals that these combined practices enhance laboratory management and strengthen research capacity within the context of Islamic higher education.

The study uses document analysis as its primary data collection method to explore the institutional context and the broader structural environment of laboratory development. It organises the analysis into two levels of documentation. First, it analyses national statistical publications, including Education Statistics 2023, Supporting Education Statistics 2024 from Statistics Indonesia, and the ICT Development Index 2023, to identify macro-level trends in educational infrastructure, digital access, and technological readiness. These macrodata were not used to measure laboratory performance directly; rather, they contextualised the institutional case by illustrating the broader structural conditions that influence digital transformation and research infrastructure in Indonesian higher education. Second, the study examines institutional documents from UIN Sunan Ampel Surabaya to understand the dynamics of laboratory management. SaTePrada platform documentation illustrated digital research processes, while laboratory SOPs clarified workflow and compliance. Facility usage guidelines described access and resource allocation. Memoranda of Understanding with external partners (the Judicial Commission of Indonesia, the Regional House of Representatives, and the Supreme Court) outlined collaboration frameworks. Documents were selected for relevance to laboratory governance and digital research management, applicability to the relevant faculties, and publication within 2020–2024 to ensure policy alignment. This analysis linked macro policy trends with institutional laboratory practices.

In-depth interviews were conducted with 12 informants from the Faculties of Sharia and Law (FSH) and Tarbiyah and Teacher Training (FTK) at UIN Sunan Ampel Surabaya. The informants consisted of six lecturers, laboratory technicians, and active student

users who were directly involved in laboratory activities. Informants were selected using purposive sampling, focusing on individuals with experience in laboratory-based teaching, research assistance, micro-teaching practice, or academic simulation activities. The interviews explored empirical experiences of laboratories functioning as research spaces, micro-teaching environments, venues for *fiqh* text analysis, and settings for legislative simulation. To ensure the relevance of the interview themes, a set of guiding questions was developed based on preliminary discussions in the literature and on institutional insights from Arif, Zainiyati, and Novi Sopwan. These questions focused on patterns of facility utilisation, the availability of research infrastructure, and the practical needs of novice researchers in using laboratories as academic workspaces. This approach enabled the study to capture both managerial perspectives and user experiences regarding laboratory functions in the academic environment.

Limited participant observation was conducted during various laboratory activities, including micro-teaching sessions, the use of text-analysis software, *baḥth al-masā'il* simulations, and room bookings through SaTePrada. This observation focused on examining factual practices: how students utilise digital technologies, how laboratory staff manage facilities and equipment, and how lecturers implement lab-based micro-research. The observations were also employed to verify the extent of alignment between the laboratory's Standard Operating Procedures (SOPs) and actual practices.

The data in this study are categorised into primary and secondary sources. The primary data consist of interviews and observations involving laboratory users within the Faculty of Sharia and Law (FSH) and the Faculty of Tarbiyah and Teacher Training (FTK). These users include lecturers teaching research methodology, mentors for early-career researchers, students utilising the laboratory for micro-teaching activities, and laboratory staff responsible for equipment lending and facilities management.

The secondary data are drawn from official publications relevant to the condition of educational infrastructure in Indonesia. These include, for example, the 2023 BPS dataset highlighting challenges in educational facility availability; APJII statistics indicating an internet penetration rate of 78.19%; and the 2023 ICT Development Index, which shows that the highest contribution derives from the usage sub-index (40.09%) alongside significant constraints in the skills sub-index (20.49%). Secondary data from external institutions such as the Judicial Commission, Regional Parliaments (*Dewan Perwakilan Rakyat Daerah/DPRD*), and the Supreme Court are also utilised to examine existing models of infrastructure co-creation implemented in other faculties of law and to assess their relevance for UIN Sunan Ampel.

Data analysis was conducted through qualitative thematic analysis consisting of four stages. First, data reduction involved filtering information according to the research focus: the transformation of religious laboratories, lecturer–student collaborative practices, the integration of digital infrastructure, and the dynamics of external partnerships. Information that did not align with the micro research hub focus was eliminated to maintain thematic coherence (Miles & Huberman, 2014). Second, thematic coding was carried out by identifying key patterns, including the needs of early-stage researchers, infrastructural limitations, micro-teaching practices, the use of SaTePrada, and collaboration patterns with external institutions. The thematic codes were constructed from factual categories in the text, such as "ICT utilisation," "infrastructural constraints," "scientific simulation," "co-creation," and "evidence-based governance." Third, inter-theme analysis was performed by linking empirical laboratory

data with national statistical data. For instance, the limited availability of computer facilities in many universities, when contrasted with the high national internet penetration rate, was analysed to illuminate structural disparities in the development of digital laboratories (Yao & Yuan, 2025). The study also examines the relationship between micro-teaching practices in the Faculty of Teacher Training and documentation within SaTePrada to understand how digital data generate patterns of competency enhancement. Fourth, the study produces an argumentative synthesis by integrating all findings into an analytical narrative and demonstrates how laboratories can function as micro research hubs through an integrative model of infrastructure, management, technology, and external collaboration.

Although this study does not employ statistical testing, a qualitative correlational analysis is applied, namely by examining the logical interconnections among institutional, structural, and technological variables. The qualitative correlation is conducted through three steps: 1) Interpreting the linkage between statistical data and institutional needs. For example, the correlation between the highest contribution of the ICT-use subindex (40.09%) and the growing reliance of FSH and FTK laboratories on digital applications for research and micro-teaching activities. 2) Assessing the correlation between field practices and infrastructural design. For instance, the high dependency of FTK students on micro-teaching laboratories is correlated with the need to modernise audio–video recording spaces. 3) Identifying correlations between external collaborative practices and laboratory quality. For example, the relationship between the Memorandum of Understanding with the Judicial Commission and the improvement of law-practicum quality based on contemporary court decisions. This qualitative correlational analysis ensures that the findings are not merely descriptive but also demonstrate factual linkages between empirical data and structural conditions.

The data validity is reinforced through source triangulation by comparing interview findings with institutional documents, national statistical data, and laboratory practices. Methodological triangulation is conducted by integrating interviews, document analysis, and direct observation. Argumentative validity is strengthened through internal critique of the statistical data for instance, by juxtaposing high levels of internet penetration with the limited human resource capacity within laboratory settings.

### III. RESULT AND DISCUSSION

#### **Collaborative Integration of Laboratory Infrastructure with Faculty and Students**

Collaboration between lecturers and students constitutes an important element in the operation of laboratories as micro-research hubs within the Faculties of Sharia and Law (FSH) and Tarbiyah and Teacher Training (FTK) at UIN Sunan Ampel Surabaya. The study uses interviews with laboratory managers, lecturers, and students involved in laboratory-based learning activities to collect empirical data. Several informants indicated that laboratories are increasingly used to support small-scale research projects addressing contemporary religious and educational issues. One lecturer from the Islamic Family Law program explained that “students collect field data on family law practices, and the laboratory becomes the space where we review the findings and discuss the *fiqh* implications together.” Similar practices were observed in the Faculty of Tarbiyah and Teacher Training, where lecturers integrate mini research projects into courses on Islamic educational research methodology. Observational data also show that students frequently utilise digital research tools available in the laboratory environment,

including hadith analysis software, *qirā'āt* mapping platforms, and e-*fiqh* indexing systems to support their assignments. According to one laboratory coordinator, these facilities help students "connect theoretical discussions in class with practical research activities." These collaborative practices indicate that laboratories are not limited to practicum sessions but also function as spaces where theoretical frameworks, methodological training, and empirical research activities intersect. The findings suggest that lecturer–student collaboration in laboratory settings strengthens research skills and encourages early engagement in academic inquiry among students (Arif, 2025; Zainiyati, 2025).

Based on observations and interviews conducted by researchers, strengthening digital infrastructure is a significant factor in supporting the development of laboratories as micro-research hubs within Islamic higher education. Digital facilities include tools for *ḥadīth* analysis, thematic *tafsīr* applications, and access to digital libraries containing classical and contemporary Islamic texts relevant to research activities conducted by students in the Faculty of Sharia and Law (FSH) and the Faculty of Tarbiyah and Teacher Training (FTK) at UIN Sunan Ampel Surabaya. Data from interviews with laboratory coordinators and lecturers indicate a growing student demand for digital tools to facilitate the retrieval and analysis of authoritative Islamic sources. In particular, informants emphasised the need for integrated digital resources that allow students to conduct text-based research more efficiently (Arif, 2025; Mahomed et al., 2016). The findings show that several laboratories now use cloud-based storage systems to enable collaborative data management among lecturers, students, and laboratory staff. Three key recommendations emerge from this study: 1) develop a comprehensive mini research database that integrates research outputs, teaching practice data, and laboratory activities; 2) provide high-performance computers for processing Arabic linguistic data with NLP, crucial for contemporary studies of *tafsīr*, *ḥadīth*, and *fiqh*; and 3) ensure stable internet connectivity and ergonomically designed research workspaces. These recommendations highlight the need to strengthen digital infrastructure as a prerequisite for enabling laboratories to support collaborative, data-driven research in Islamic higher education.

A knowledge repository constitutes a fundamental component in positioning the laboratory as a micro-research hub across both faculties. It serves as a centralised platform for storing scholarly works, mini-research reports, analyses of *ḥadīth* or *fiqh*, and other digital outputs (Rusydiyah, 2025). Within the Faculty of Sharia and Law, the repository can accommodate outputs from Islamic legal case studies, such as analyses of religious court decisions, fatwa studies, or mappings of local socio-religious issues. Meanwhile, in the Faculty of Education and Teacher Training, the repository may compile micro-teaching results, learning-tool development, and curriculum analyses for Islamic Religious Education (Sopwan, 2025; Zainiyati, 2025). The knowledge repository functions as a reusable data bank for subsequent generations of researchers and serves as a mechanism to prevent duplication of research activities. Another key benefit lies in increasing the readability index and disseminating knowledge across study programs, thereby strengthening a collaborative academic culture. Organising the repository with standardised metadata enhances data retrieval, educational review, and accreditation procedures. Thus, the repository becomes a strategic instrument that reinforces the sustainability of micro-research produced by religious studies laboratories.

Religious laboratories can function as scientific simulation spaces that accommodate various methodological experiments. For example, the simulation of *baḥth al-masā'il* and courtroom proceedings at the Faculty of Sharia and Law can serve as a *fiqh al-maqāṣid*-based problem-solving model designed to train students' legal argumentation skills (Sopwan, 2025; Zhang & Li, 2021). Through these activities, students become accustomed to processing empirical data before formulating socially contextualised legal conclusions. At the Faculty of Tarbiyah and Teacher Training (FTK), the laboratory can operate as a venue for micro-teaching simulations grounded in an integrative approach that connects pedagogical theory with religious data. Such simulations train students to relate Qur'anic verses and Prophetic traditions to contemporary social dynamics encountered in actual classroom settings. Moreover, laboratory spaces enable experimentation with contextual Qur'anic hermeneutics, including discourse analysis, the mapping of social themes in the Qur'an, and the analytical examination of legal products. Accordingly, the laboratory becomes not merely a site for data collection but also an arena for the practical application of religious theory. This model of scientific simulation strengthens students' methodological awareness, analytical proficiency, and synthetic capabilities across faculties.

### **Co-Creation of Laboratory Infrastructure with External Partners**

The development of laboratory facilities and infrastructure through a co-creation approach reflects a strategy centred on collaboration and resource pooling between FSH, FTK at UIN Sunan Ampel Surabaya, and external partners. Document analysis and interviews with laboratory managers and lecturers revealed that conventional, centralised, and administrative infrastructure development often fails to meet practical user needs. These findings underscore the importance of a participatory model where laboratory planning engages academic stakeholders and institutional partners from the outset. From the perspective of Islamic educational management, the co-creation model allows laboratory development to align more closely with curricular demands, the epistemological character of Sharia, legal, and educational studies, and the professional expectations of partner institutions. Several collaborative initiatives have already been initiated. For example, cooperation with the Judicial Commission of Indonesia provides access to materials on judicial ethics and case-based learning resources that support legal practicum activities in the faculty's laboratory environment (UINSA, 2024). In addition, institutional cooperation with the Supreme Court of the Republic of Indonesia has facilitated access to court decision databases, which serve as reference materials for Islamic legal analysis and student research. These collaborations demonstrate how laboratory infrastructure can evolve into a comprehensive academic ecosystem that integrates physical facilities, data resources, digital platforms, and professional networks. Here, co-creation acts not only as a means for building institutional facilities but also as an academic-strengthening process that positions the university within broader legal and educational networks.

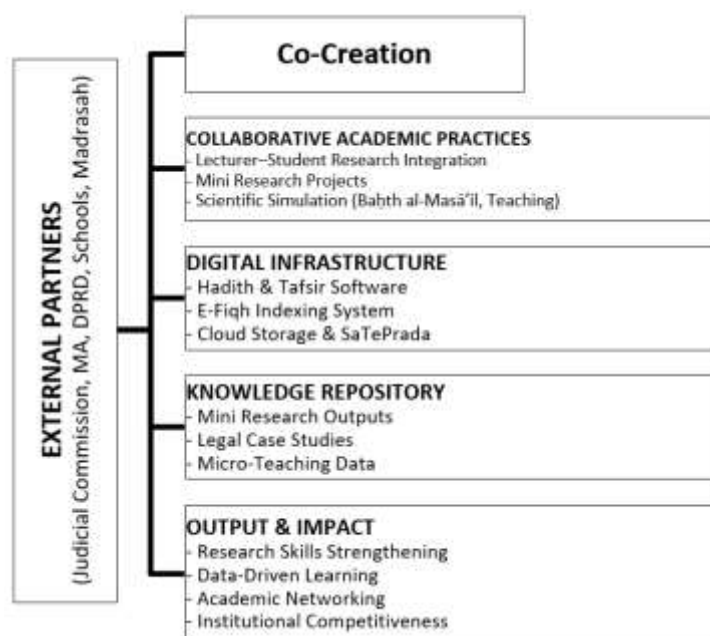
Laboratories within the Faculty of Sharia and Law require facilities capable of accommodating the analytical needs of both Islamic law and positive law. Accordingly, co-creation with external institutions serves as a mechanism for enhancing academic relevance. In this regard, the Regional House of Representatives (DPRD) can function as a strategic partner by providing access to regional legislative data, meeting minutes, and documentation from the drafting processes of local regulations, all of which may be utilised as materials for practical legislative analysis (Sadr et al., 2020). This is

essential, as students often lack direct access to legal documents that are contextual, dynamic, and procedurally generated. Co-creation facilitates the lawful and structured opening of data access, enabling the laboratory to develop learning modules grounded in real case studies. As a result, students can cultivate more applicable analytical competencies in addressing contemporary legal issues. Moreover, the laboratory can operate as a mini policy studio such as space where students, lecturers, and external partners conduct simulations of evidence-based public policy formulation (Gunarto, 2018). Through this mechanism, laboratory facilities function not merely as instructional tools but as professional-oriented hubs of scientific practice. Such a model shifts the paradigm of legal laboratories from being mere observational spaces to becoming arenas for the collaborative production of knowledge.

In the Faculty of Education and Teacher Training, co-creating laboratory infrastructure is essential to addressing long-standing challenges in micro-teaching practice and the development of instructional tools, which have often remained confined to technical, repetitive approaches. Collaboration with partner educational institutions such as public schools, leading madrasahs, and teacher-training centres can enrich practicum content with empirical data that reflects the field's actual needs. At the same time, partnerships with institutions such as the Judicial Commission can strengthen the laboratory for professional ethics in education, particularly as issues of integrity and professionalism among educators increasingly draw public attention. Co-creation also enables the renewal of digital laboratory facilities, including the integration of video-analysis technologies for instructional observation, competency-based faculty performance evaluation tools, and supporting instruments for academic course design. This approach aligns the competencies of graduates of the Faculty of Education and Teacher Training with the demands of educational institutions that require digital literacy, critical pedagogy, and social sensitivity (Ce et al., 2015; Zainiyati, 2025). A collaboratively developed laboratory can provide authentic learning experiences that enhance pre-service teachers' teaching skills, classroom management, and reflective capacities. Accordingly, co-creating laboratory infrastructure is a crucial strategy for improving the quality of graduates amid the evolving landscape of the national education ecosystem.

The digital dimension constitutes a central component in the laboratory infrastructure co-creation model, particularly through the integration of SaTePrada as a database for educational practicum activities and laboratory-based research. SaTePrada enables lecturers and students to store, access, and analyse teaching-practice data, including micro-teaching recordings, instructional materials, and classroom-observation reports (Zainiyati, 2025). Through co-creation, external partners such as collaborating schools—are granted access to SaTePrada, allowing them to provide professional feedback that enriches practicum content. This process produces a collaborative ecosystem in which data becomes the object of interaction among educational actors. The presence of SaTePrada also facilitates the integration of physical and digital laboratory environments into a unified learning system. At the managerial level, the application supports laboratory administrators in mapping infrastructure needs based on data-driven analyses of usage patterns and emerging student competency trends. From the perspective of Islamic educational epistemology, digitalisation initiatives such as SaTePrada foster the development of evidence-based teaching, namely educational practices grounded in empirical evidence. Co-creation with external partners ensures that such evidence remains aligned with ongoing social changes and contemporary pedagogical developments.

Co-creation of laboratory infrastructure also carries significant implications for institutional governance, as it promotes a shift from a closed bureaucratic model toward a more inclusive, adaptive, and socially responsive partnership system. In the context of the Faculty of Sharia and Law, the Supreme Court's involvement in developing a Sharia legal laboratory can strengthen academic legitimacy and connect the laboratory to the evolving dynamics of national jurisprudence. Through mechanisms for sharing judicial decision data, students can examine patterns of judicial *ijtihad*, legal reasoning, and shifts in statutory interpretation as reflected in actual rulings (Arif, 2025). For the Faculty of Education and Teacher Training, collaboration with local educational institutions helps standardise micro-teaching facilities in line with contemporary school needs, including ICT tools, interactive learning media, and virtual classroom simulations. Co-creation also enables mechanisms of mutual accountability, referring to a two-way system of responsibility between the university and partner institutions in the utilisation of laboratory infrastructure (Rusydiyah, 2025). Accordingly, laboratories are no longer viewed merely as internal assets but as collectively empowered academic public spaces. Such a governance model reinforces transparency, sustainability, and quality orientation in the development of laboratory facilities.



**Figure 1.** Integrated laboratory ecosystem

This figure illustrates that: Building on this, the laboratory is not merely a practical workspace, but rather an integrative node. Within this integrative context, there are three principal layers: collaborative practice, digitalisation, and repository systems. Finally, co-creation functions as an external driver that expands the academic ecosystem.

Importantly, building laboratory infrastructure is more than just working together on technical issues; it is also a place for different ways of knowing to meet. Research shows this teamwork brings together different approaches: the Judicial Commission and Supreme Court focus on rules and procedures, while universities offer more analysis, theory, and reflection. In the lab, these different views interact, which can improve both legal research and teaching (Chen, 2021). From this analytical perspective, integrating judicial decision analysis with the *maqāsid al-sharī'ah* framework, for instance, can provide a broader understanding of the rational considerations underlying judicial

reasoning. In the context of the Faculty of Tarbiyah and Teacher Training, collaborative laboratory activities also allow the interaction between contemporary pedagogical approaches—such as critical pedagogy—and school practices that are often administratively oriented. Therefore, this section should be understood as the author’s analytical interpretation of the research results, suggesting that laboratory collaboration may serve as a platform for connecting different epistemic traditions. In this sense, the laboratory can be viewed not only as a space for practicum activities but also as an institutional environment that facilitates reflective learning and knowledge exchange within Islamic higher education institutions (*Perguruan Tinggi Keagamaan Islam Negeri/PTKIN*).

In the economics of education, laboratory infrastructure co-creation also functions as a resource-optimisation strategy through cost-sharing, facility exchange, and managerial efficiency (Suseno & Riswanto, 2017). The Faculty of Sharia and Law, for instance, may agree with the Regional House of Representatives (DPRD) to use the legislative simulation chamber as part of the practicum on drafting regional regulations. This arrangement prevents the laboratory from having to construct all facilities independently. Conversely, the DPRD can draw on the university's academic expertise to assess the social impacts of proposed regulations (Arif, 2025; Mulleta et al., 2021). On the FTK side, partner schools can provide observation rooms and practice classrooms that are then integrated with SaTePrada data, thereby eliminating the need for the university to finance the construction of a new micro-teaching studio fully. This model reduces budgetary waste and strengthens the sustainability of infrastructure development. Theoretically, co-creation generates co-production of value, a process of joint value creation between the university and external partners (Konger et al., 2016; Zainiyati, 2025). Through this mechanism, laboratory infrastructure achieves higher quality at lower cost and with benefits more equitably distributed.

Ultimately, the co-creation of laboratory infrastructure at UIN Sunan Ampel Surabaya should be positioned within a long-term agenda to cultivate a collaborative, interdisciplinary, and data-driven scientific ecosystem. The integration of the SaTePrada application enables the development of an educational laboratory model that is responsive to school needs and aligned with twenty-first-century pedagogical competencies. On the other hand, partnerships with the Judicial Commission, the Supreme Court, and regional legislative bodies strengthen the legal laboratory through enriched datasets, professional instruments, and access to institutional practices within the state apparatus. This synergy generates a learning model that unifies theoretical inquiry, practical engagement, and digital analysis within a single academic ecosystem. If developed consistently, such co-creation has the potential to enhance graduate quality, reinforce the institution’s standing in accreditation processes, and widen both academic and professional networks. This approach also consolidates the university’s presence as a public institution actively involved in shaping a culture of legal integrity and educational ethics. Thus, the co-creation of laboratory infrastructure is not merely a managerial strategy; it constitutes a strategic pathway to strengthening the academic competitiveness and social contribution of UIN Sunan Ampel Surabaya.

### **Strengthening Early-Stage Research Through the Laboratories of *Fiqh*, Hadith, and Qur’anic Exegesis**

The strengthening of beginner-level research at UIN Sunan Ampel Surabaya necessitates the systematic utilisation of religious laboratories as epistemic spaces for integrating theory, data, and scientific practice (Mustofa, 2019). The Fiqhuna Center Laboratory, the Constitutional and Legislative Studies Laboratory, and the Computer Laboratory within the Faculty of Sharia and Law function not merely as facilities, but as arenas for collaborative knowledge production. This orientation aligns with students' needs to cultivate analytically robust and methodologically reliable skills for interpreting contemporary Islamic legal discourse. Complex phenomena such as the digitalisation of fatwas, the contestations surrounding legislative processes, and the dynamics of judicial decisions require practicum environments that enable students to access legal data in structured ways (Arif, 2025; Ginanjar et al., 2023; D. Li et al., 2020). When novice researchers are guided to map cases using digital tools, they learn to formulate research problems with greater precision. Moreover, a laboratory-based approach helps narrow the gap between theoretical competence and practical skills that often persists in conventional classroom settings. This paradigm positions the laboratory as a point of convergence between academic abstraction and the empirical demands of legal and religious domains. Consequently, the strengthening of beginner research becomes a collective process that interlinks institutions, laboratories, and students as co-producers of knowledge.

Within the Faculty of Tarbiyah and Teacher Training, the Micro-Teaching Laboratory, the Integrated Computer Laboratory, and the Language Laboratory function as strategic pedagogical spaces that reinforce practice-based preliminary research. Research in Islamic education requires measurable empirical observation, and laboratories serve as controlled environments for testing methodological tools directly. When students conduct instructional simulations, they can evaluate the effectiveness of teaching strategies, the validity of research instruments, and learners' responses under controlled conditions. This process generates authentic data that enhances research quality from its earliest stages. In this context, laboratory practice is not merely a technical exercise but an epistemic process that trains students to think critically about pedagogical phenomena (Patel et al., 2024; Rismawati, 2025). Accordingly, laboratories within the Faculty function as instruments of pedagogical transformation, enabling students to produce research that is grounded, coherent, and evidence-based. This role is especially crucial amid the increasing complexity of professional demands placed upon teachers. Therefore, strengthening beginner-level research within the Faculty requires coordinating laboratory equipment, academic supervision, and adaptable methodological frameworks.

Collaboration with external partners, such as the Judicial Commission, the Regional House of Representatives (DPRD), and the Supreme Court, opens avenues for the actualisation of beginner-level research by using more authentic, contextually grounded legal data. Students have access to legislative documents, judicial ethics reports, public records, and commission meeting minutes relevant to the study of Sharia and law. Such external data enriches the analytical work conducted in the laboratory, particularly within the Center for Constitutional and Legislative Studies, which serves as a strategic hub for legal research. The integration between the laboratory and external institutions produces a research model that is not only academically oriented but also responsive to the dynamics of public policy (Musyafaah, 2025). Early-stage researchers learn that legal inquiry cannot rely solely on the literature; it must be grounded in ongoing shifts in regulatory frameworks and evolving public discourse. This collaboration also

facilitates more contextual, case-based research, for example, comparative analyses of judicial reasoning or critical examinations of specific draft laws. Through this collaborative framework, the laboratory functions as an epistemic bridge between the university and state institutions. Consequently, beginner-level research is afforded a more relevant and higher-quality learning environment.

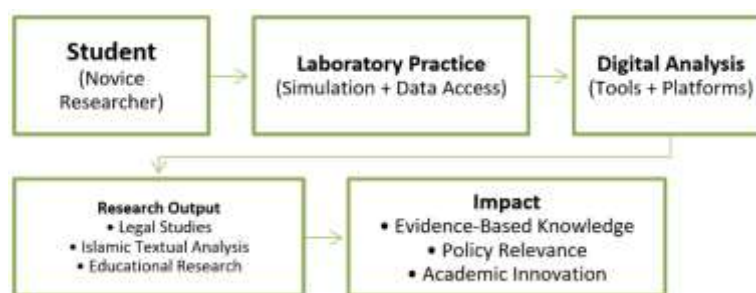
The strengthening of beginner-level research in the Qur'anic exegesis and Hadith laboratories requires adopting appropriate digital tools with a strong orientation toward text-based data. Students often encounter difficulties in navigating digital classical sources, mapping chains of transmission (*sanad*), or constructing exegetical arguments grounded in the methodology of *ma'ānī al-Qur'ān*. In this context, the computer laboratory and the Fiqhuna Center can facilitate the use of digital analytical tools, such as Hadith software, *tafsīr* applications, and Islamic law databases (Syamsuri, 2025). By utilising these tools, students gain a more systematic research experience, particularly in conducting content analysis and engaging in advanced literature studies. This reinforcement is essential because text-based analytical competencies constitute the foundation of religious scholarship. As students learn to connect classical texts to contemporary social contexts, they develop critical capacities that advance academic discourse. Moreover, the laboratory can introduce open-source tools that assist students in organising data, compiling bibliographies, or conducting comparative analyses of scholarly opinions. Accordingly, the digitalisation of Qur'anic exegesis and Hadith laboratories accelerates the internalisation of essential research skills within the broader tradition of Islamic scholarship.

SaTePrada serves as a strategic tool that can be integrated into the Faculty of Teacher Training (FTK) laboratories to strengthen early-stage research grounded in educational practice. This platform stores a comprehensive database of students' teaching practicum activities, making it a highly valuable longitudinal data source for research in Islamic education. Through SaTePrada, students gain access to their recorded teaching practices, allowing them to review instructional strategies and evaluate the effectiveness of their micro-teaching sessions more systematically and comprehensively. The integration of SaTePrada with computer laboratories and micro-teaching laboratories creates an evidence-based research ecosystem. This ecosystem equips students with the ability to develop research competencies from the early stages of their academic trajectory, including analysing pedagogical errors, mapping learning styles, and assessing learner responses. SaTePrada also facilitates the development of quantitative, qualitative, and mixed-methods research based on authentic data. Moreover, the application provides a space for advancing digital learning innovations. Consequently, SaTePrada enhances the laboratory's role as a modern, adaptive hub for pedagogical research (Church & Naugler, 2020).

In the Faculty of Sharia and Law, laboratory-based learning enables novice students to test legal research methodologies empirically. Practices such as decision analysis, trial simulations, and case mapping can be systematically conducted at the Center for Constitutional and Legislative Studies (Musyafaah, 2025). This approach provides both theoretical and operational research experience. Students are guided to examine the textual details of judicial decisions, map the structures of legal reasoning, and identify argumentative gaps relevant to both Islamic law and positive law. These practices reinforce critical legal reasoning skills essential to contemporary legal studies. In addition, computer laboratories may be utilised to process legal statistical data, thereby directing beginner research toward quantitative analysis. This approach complements

the text-based analytical competencies previously developed through literature studies. Consequently, laboratories help construct an integrated research framework that supports students' academic quality.

At the institutional level, strengthening early-stage research requires an integrated orchestration of laboratory infrastructure management across the Faculty of Sharia and Law (FSH) and the Faculty of Tarbiyah and Teacher Training (FTK) (Ananda & Banurea, 2017). The optimal functioning of a laboratory depends on the quality of its management, the preparedness of its human resources, and the consistency of equipment renewal. When a laboratory is perceived merely as a physical facility, its epistemic potential remains insufficiently explored. Therefore, inter-faculty collaboration becomes a critical strategy for reinforcing a multidisciplinary research ecosystem. Students from FSH may draw on FTK's pedagogical approaches to examine the educational dimensions of legal studies. In contrast, FTK students may use legal laboratories to deepen their understanding of academic regulations. This pattern fosters interdisciplinary synergy, enriching the early research experience in both faculties. Consequently, laboratory management is not solely administrative in orientation, but also a form of sustained academic engineering. This strengthens UIN Sunan Ampel's position as a center for scientific development grounded in integrative–interconnective scholarship (Riswanto et al., 2019).



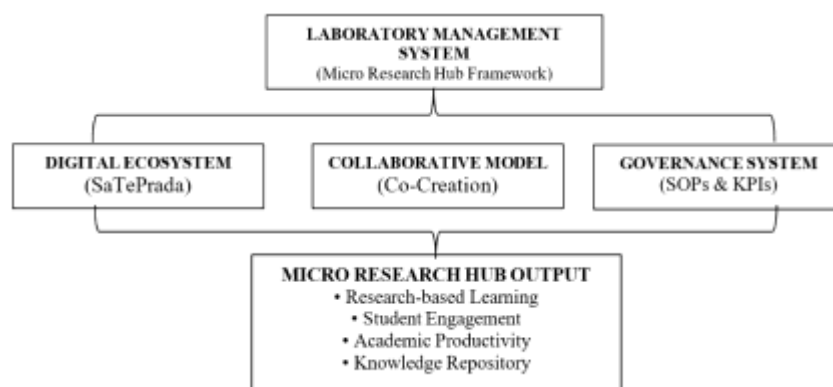
**Figure 2.** Research process flow (key distinctive value)

Overall, strengthening beginner-level research through laboratories in *fiqh*, hadith, Qur'anic exegesis, law, and education requires integrating infrastructure, pedagogy, technology, and external collaboration. The success of this program lies in the institution's ability to position laboratories as dynamic epistemic spaces rather than mere formal units. Early-stage research must be directed toward producing knowledge relevant to public concerns whether through partnerships with state institutions such as the Judicial Commission or the Regional People's Representative Council, or through the use of internal platforms like SaTePrada. This approach ensures that the research process remains connected to the shifting social, legal, and educational realities. Consequently, laboratories do not merely function as training venues; they evolve into centers of innovation that cultivate a generation of precise and critical researchers. The integration of digital data, simulation-based practices, and legal and pedagogical instruments positions the laboratory at the core of academic development. Therefore, the reinforcement of beginner-level research must be continually framed as a long-term strategy to enhance the quality of Islamic higher education. At the same time, it underscores that laboratory transformation is a crucial component in building PTKIN's academic excellence in the digital era.

### Laboratory-Based Structured Research Management Model

A structured, laboratory-based research management model at the faculty level constitutes a strategic necessity for addressing the academic demands of the twenty-first century. The strengthening of laboratories is no longer merely complementary; it has become a foundational pillar for evidence-based research capable of bridging scientific theory with the dynamics of socio-legal and educational praxis. Within the context of Islamic Higher Education Institutions (PTKIN), laboratory research requires a systemic approach that integrates methodological expertise, digital competencies, and contemporary Islamic epistemological frameworks (Sucipta et al., 2017). Structured management is essential to ensure that research activities undertaken by students and faculty proceed in a consistent, coherent, and goal-oriented manner, ultimately producing high-quality academic outputs. Moreover, the presence of well-established laboratories such as the Computer Laboratory, Puskolegis, and the Fiqhuna Center in FSH, as well as the Integrated Computer Laboratory, Microteaching, Mathematics, and Language Laboratories in FTK constitutes a significant institutional asset. However, without standardised research management, these laboratories have yet to fully contribute to strengthening academic competitiveness. Therefore, structured research must serve as an institutional strategy for cultivating a sustainable scientific tradition.

Standard Operating Procedures (SOPs) and Key Performance Indicators (KPIs) serve as the foundational governance instruments within the Laboratory Management System, ensuring that laboratories are transformed into micro research hubs in a structured, accountable, and measurable manner. SOPs provide standardised workflows that regulate research activities, including access management, data collection, supervision, and documentation, thereby minimising procedural ambiguity and enhancing operational consistency across faculties. Meanwhile, KPIs serve as evaluative metrics to assess laboratory performance, such as utilisation rates, research outputs, student engagement, and collaboration intensity with external partners. The integration of SOP and KPI frameworks enables data-driven decision-making, strengthens institutional transparency, and aligns laboratory activities with broader academic objectives. Consequently, these governance mechanisms not only optimise resource management but also reinforce the sustainability and quality assurance of interdisciplinary research ecosystems in higher education.



**Figure 3.** *Laboratory management system as research hub*

Previous research management models have often been constrained by the limited integration between the curriculum, laboratory functions, and the faculty’s research orientation. Many student research activities were conducted sporadically and failed to make optimal use of laboratory facilities, resulting in research processes that lacked clear methodological direction (Zuhdi et al., 2017). The absence of cross-laboratory

research SOPs has led to fragmentation among experimentation, observation, and theoretical inquiry domains that should, in principle, be mutually reinforcing. At the Faculty of Sharia and Law (FSH), for example, the Fiqhuna Center and the Center for Constitutional and Legislative Studies often function merely as discussion spaces rather than as laboratory-based hubs for legal data analysis. Similarly, at the Faculty of Tarbiyah and Teacher Training (FTK), the Micro-Teaching Laboratory is used primarily for teaching practice rather than for developing evidence-based pedagogical research. Another challenge concerns students' weak digital literacy, which limits equitable access to database-driven research tools and legal analysis software. This situation illustrates the need for a new governance model that systematically links laboratory activities with the institution's broader academic agenda. Without such reform, laboratories will remain passive facilities that fail to cultivate a robust research culture.

A structured research management model was formulated based on the thematic analysis of interview data, institutional documents, and observations of laboratory practices conducted in the laboratories of the Faculty of Sharia and Law and the Faculty of Tarbiyah and Teacher Training at UIN Sunan Ampel Surabaya. The analysis indicates three interrelated components that shape the functioning of laboratories as research-supporting environments. First, the methodological design provides a standardised workflow for research activities, including problem formulation, data collection, analysis, and validation. Second, laboratory operational management regulates how laboratory facilities support the research process, including the provision of analytical software, legal simulation environments, and micro-teaching equipment (Arif, 2025; Zainiyati, 2025). Third, digital integration, which connects laboratory activities to an institutional database system that enables documentation, monitoring, and coordination of research activities. Empirical data from laboratory managers and lecturers show that digital platforms improve access to research resources. They also enhance coordination among academic users. For example, the Center for Legislative Studies provides regulatory datasets that support constitutional research. The Language Laboratory offers digital linguistic tools to support text-based analysis in Qur'anic and ḥadīth studies. These findings show that methodological procedures, operational management, and digital infrastructure work together within the laboratory research ecosystem. Together, these components form a management framework that supports systematic research and strengthens the institution's capacity for collaboration.

The SaTePrada application is a digital platform that supports documentation, monitoring, and evaluation of students' academic practices through an integrated database. Initially built to manage teaching practicum activities at the Faculty of Tarbiyah and Teacher Training (FTK) of UIN Sunan Ampel Surabaya, the platform has gradually been used to record broader academic activities in laboratory-based learning and student research. Institutional reports show SaTePrada archives teaching-practice records, such as video recordings, lesson plans, evaluation rubrics, and supervisor feedback (Zainiyati, 2025). These records form datasets reusable for pedagogical evaluation and classroom research. Through this system, micro-teaching and computer laboratories can systematically store instructional practice data to support both qualitative and quantitative studies. Thus, SaTePrada serves not only as a digital administrative tool but also as a repository that enables structured documentation of academic activities.

Faculty–student collaboration is vital to laboratory-based research. Faculty and students use lab facilities and contribute to knowledge production (ITS, 2024). Faculty members

design research frameworks, supervise methods, and ensure quality in settings such as the Fiqhuna Center and the Center for Constitutional Studies. Students collect data, document findings, and conduct preliminary analysis in supervised activities. These interactions occur in structured forums, such as research clinics, policy analysis workshops, and evaluation sessions using lab infrastructure. Such activities build students' analytical skills, like analysing court decisions or assessing teaching practices in recorded sessions (Miles & Huberman, 2014).

The effectiveness of laboratories as research environments increases when they are connected to external institutions, as these connections provide concrete access to empirical cases, policy processes, and authentic educational contexts. For example, the Center for Constitutional Studies' collaboration with the DPRD offers opportunities to analyse legislative processes. At the same time, the Fiqhuna Center's work with judicial institutions facilitates research on ethical questions in decision-making. The Micro-Teaching Laboratory at FTK gains real classroom data from partner schools, which are then archived in SaTePrada for pedagogical analysis. Through these collaborations, laboratories gain key benefits: richer research data, practical case studies, and direct exposure to institutional realities, thereby significantly extending their impact beyond academic training (Fauziah & Muliawan, 2024).

To ensure that laboratory-based research remains systematic, adequate data governance is required. Laboratories at the Faculty of Sharia and Law (FSH) and FTK, therefore, need to implement structured workflows that include proposal development, data collection, analysis, and the preservation of research outputs. Within this framework, SaTePrada can serve as a centralised database for observational records, interview documentation, teaching-practice videos, and analytical reports. Such documentation enables faculties to review academic activities periodically and to monitor the continuity of research practices across courses and research programs. Consistent data archiving also creates opportunities for longitudinal analysis of pedagogical and legal research activities. Through structured management and digital documentation, laboratories can gradually evolve into institutional environments that support sustainable academic research rather than serving solely as practicum facilities.

**Table 1. Laboratory Distinction in FSH and FTK**

No	Dimension	FSH	FTK
1	Orientation	Legal-Normative	Pedagogical-Empirical
2	Lab Type	<i>Fiqh</i> , Legal Lab	Microteaching, Language
3	Research Object	Law, Fatwa, Policy	Learning, Teaching
4	Method	Textual & Simulation	Observation & Experiment
5	Output	Legal Analysis	Educational Innovation
6	Character	Legal-Analytical Hub	Pedagogical-Experimental Hub

A structured laboratory-based research management model in the Faculty of Sharia and Law and the Faculty of Tarbiyah and Teacher Training at UIN Sunan Ampel Surabaya should be developed based on empirical findings derived from interviews, limited observations, and institutional document analysis. Interview data with laboratory managers and lecturers indicate that existing laboratory activities remain largely oriented toward practicum functions, while research utilisation and cross-unit

collaboration are still developing. Observation of laboratory activities also reveals that digital integration and systematic documentation of research practices are not yet fully optimised. These findings are reinforced by document analysis showing that laboratory guidelines, partnership mechanisms, and research mentoring systems require further institutional consolidation.

Based on this empirical analysis, the study proposes a laboratory-based research management model that integrates five key elements: laboratory infrastructure, lecturer–student collaboration, digital platforms such as SaTePrada, co-creation with external partners, and structured mentoring for novice researchers. Within this framework, digital systems support documentation, monitoring, and coordination of research activities, while external collaboration ensures access to empirical data and professional feedback. The integration of these components forms a research ecosystem that enables laboratories to function not only as practicum facilities but also as institutional spaces supporting research-based learning.

#### **IV. CONCLUSION**

The findings of this study indicate that the transformation of religious laboratories into micro research hubs at UIN Sunan Ampel Surabaya is strongly influenced by the effectiveness of educational infrastructure management within Islamic higher education. Empirical evidence from interviews with laboratory managers and lecturers indicates that most laboratory activities remain focused on practicum services, suggesting that facility and infrastructure management have not yet been fully optimised to support research productivity. From a managerial standpoint, this condition underscores the importance of systematically planning, organising, utilising, and monitoring educational resources so that laboratories can operate not only as instructional spaces but also as environments that facilitate knowledge production. The study also finds that digital management systems play a significant role in improving laboratory governance. Respondents emphasised that digital platforms are needed to manage laboratory resources, document research outputs, and monitor academic activities more transparently and efficiently. Key recommendations include implementing SaTePrada as a data-based management platform to organise research repositories, coordinate facility use, and supervise student research activities. Furthermore, observational findings reveal that collaboration with external institutions remains limited and largely dependent on individual initiatives, indicating the absence of a structured partnership framework. In addition, several laboratory staff reported limited experience in managing research-oriented programs, highlighting the need for capacity development through professional training in research supervision and digital management. Overall, the study concludes that effective management of Islamic educational infrastructure—supported by digital governance, institutional collaboration, and competent personnel—is essential to enabling laboratories to function as sustainable research hubs that advance research in Islamic law, education, and public policy.

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