Integrating Serial, Practice-Based Research into Undergraduate Learning: A Real-Time Model for Developing Research Competency

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Submitted: July 1, 2025 -Revised: July 20, 2025 -Accepted: July 26, 2025

ABSTRACT

Research education in higher learning, particularly within health and applied sciences, is often fragmented and overly theoretical, offering limited opportunities for students to engage in the full cycle of empirical inquiry. As a result, graduates frequently lack the practical skills and confidence needed to design, implement, and disseminate research grounded in real-world problems. To address this gap, this paper proposes a structured, field-based serial research learning model that guides students through a continuous, semester-long process—from problem identification and instrument development to data collection, analysis, and publication. The urgency of this model is reinforced by the demands of Outcome-Based Education (OBE) and national accreditation standards, all of which emphasize experiential, measurable, and context-driven learning. Through this approach, students not only grasp research methodology conceptually but also internalize research competencies through direct engagement in field-based projects. This paper outlines the model's structure, pedagogical rationale, implementation challenges, and potential for cross-disciplinary replication. Findings indicate that the strategy enhances student research capacity, strengthens curriculum relevance, and supports measurable, impactful learning outcomes.
Keywords: serial research learning; experiential education; undergraduate research; research methodology; scholarly publication

INTRODUCTION

In contemporary higher education, particularly within applied disciplines such as health sciences, education, and social development, the ability of students to conduct meaningful research is increasingly recognized as a core competency.[1] However, traditional approaches to teaching research methodology often rely heavily on theoretical instruction, fragmented exercises, and simulated case studies that fail to capture the complexity and dynamism of real-world inquiry.[2] As a result, many students graduate with limited practical experience in designing and executing research, and with insufficient confidence to contribute to evidence-based practice or scholarly discourse.[3]

This disconnect between theory and practice presents a critical challenge for institutions seeking to produce graduates who are not only knowledgeable but also capable of applying research skills to solve empirical problems in their professional environments. In fields such as public health, for example, the ability to identify community-based issues, formulate research questions, collect and analyze data, and communicate findings is essential for improving service delivery, informing policy, and advancing health outcomes.[4] Yet, without direct exposure to the full research cycle, students often struggle to internalize methodological principles or appreciate the ethical, cultural, and contextual dimensions of research.[5]

To address this gap, there is an urgent need for pedagogical models that integrate experiential learning with structured research training. One promising approach is the implementation of a field-based, serial research learning strategy, in which students engage in a continuous, step-by-step research process throughout a semester. This model transforms research education from a passive, segmented experience into an active, coherent journey, beginning with empirical problem identification and culminating in the publication of findings. By embedding research into the fabric of learning, students are empowered to become investigators, collaborators, and contributors to knowledge production.

The urgency of adopting such a model is further underscored by evolving educational standards, accreditation requirements, and workforce expectations. Outcome-Based Education (OBE),[6] for instance, emphasizes the demonstration of competencies through authentic tasks and measurable results. Similarly, national initiatives such as Indonesia's *Merdeka Belajar Kampus Merdeka (MBKM)* call for more flexible, context-driven, and student-centered learning experiences.[7] In this landscape, the serial research learning strategy offers a timely and transformative solution, one that aligns academic rigor with societal relevance, and prepares students to navigate the complexities of research in diverse professional settings.

This paper presents a comprehensive overview of the serial, practice-based research learning model, detailing its structure, pedagogical rationale, strengths, challenges, and potential for institutional integration. Through this model, we aim to redefine research education as a dynamic, inclusive, and impactful process that equips students not only to learn about research, but to live it.

STRATEGY AND STRUCTURE OF THE LEARNING MODEL

The proposed model unfolds in a series of interconnected phases, each aligned with a weekly or biweekly instructional module. Students work in small groups to conduct a full research cycle, guided by structured milestones and continuous mentorship. The phases include: 1) preliminary field survey; 2) problem formulation and literature review; 3) conceptual framework and hypothesis development; 4) research design and methodology; 5) data collection and analysis; 6) discussion and conclusion; and 7) report writing and publication.

Phase 1: Preliminary Field Survey – Identifying Empirical Problems

In the first week, students are grouped and assigned to conduct a preliminary field survey in a real-world setting, such as a community health center, rural clinic, or urban neighborhood. Their task is to observe, interview stakeholders, and document phenomena that may indicate a research-worthy issue. Example: A group visits a rural health post and discovers that many pregnant women are not attending antenatal care (ANC) visits regularly. They record observations, conduct informal interviews, and collect basic descriptive data.

Phase 2: Problem Formulation and Literature Review

Based on their field findings, students formulate a clear research problem. They then conduct a literature review using academic databases to understand existing knowledge and gaps. This phase includes writing a problem statement and defining research objectives. Example: The group formulates the problem: "What factors contribute to low ANC attendance among pregnant women in Sukorejo District?" They review studies on maternal health behavior, access barriers, and cultural influences.

Phase 3: Conceptual Framework and Hypothesis Development

Students construct a conceptual framework that visually maps the relationships between variables. They then formulate hypotheses based on theory and prior research. Example: The framework includes variables such as distance to health facility, knowledge of ANC benefits, family support, and economic status. A hypothesis might be: "Women with higher knowledge of ANC benefits are more likely to attend ANC visits."

Phase 4: Research Design and Methodology

Students design their study, selecting appropriate methods (quantitative, qualitative, or mixed), sampling techniques, instruments (e.g., questionnaires, interview guides), and ethical protocols. Example: The group chooses a cross-sectional survey design, targeting 100 pregnant women across three villages. They develop a structured questionnaire and submit their protocol for ethical review.

Phase 5: Data Collection and Analysis

Students conduct fieldwork to collect data, ensuring quality and ethical compliance. Afterward, they analyze the data using statistical software or qualitative coding techniques. Example: Data is collected over two weeks. The group uses SPSS to run descriptive statistics and logistic regression to test their hypothesis. They find that knowledge and family support are significant predictors of ANC attendance.

Phase 6: Discussion and Conclusion

Students interpret their findings in light of the literature, discuss implications, and draw conclusions. They reflect on limitations and suggest recommendations. Example: The group discusses how health education and family engagement could improve ANC attendance. They note that economic factors were not significant in their sample, possibly due to uniform poverty levels.

Phase 7: Report Writing and Publication

Students compile their research into a formal report, following academic writing conventions. They present their findings in class and submit their work to a student journal or institutional repository. Example: The final report includes abstract, introduction, methods, results, discussion, conclusion, and references. The group presents their study at a student research symposium and submits it to the university's health science journal.

DISCUSSION

The field-based serial research learning strategy is a pedagogical approach designed to integrate students' real-world experiences with systematic scientific inquiry. This strategy positions students as active agents in identifying, formulating, and solving empirical problems they encounter directly in the field. Through seven sequential phases, from initial survey to publication, students not only acquire knowledge but also develop critical thinking, analytical, and communication skills essential for both academic and professional advancement.

This approach is grounded in the belief that meaningful learning occurs when students engage directly with social and environmental contexts.[8-12] It aligns with the principles of constructivism and Outcome-Based Education (OBE), emphasizing not only the transmission of knowledge but also the achievement of measurable and relevant competencies.[6]

Authenticity and Contextual Relevance

One of the core strengths of this strategy is its authenticity. Students do not learn from artificial case studies but from real phenomena they observe and investigate themselves. For example, in a public health context, students may identify low antenatal care (ANC) attendance in a rural village, formulate research questions, design instruments, and collect data directly from the community. This process enhances learning motivation and fosters a sense of ownership over both the process and outcomes.

The strategy is also highly adaptable across disciplines. Whether in health sciences, education, social studies, or engineering, it can be tailored to suit the nature of the problem and the appropriate methodology. The final output, typically a research report or academic article, provides students with opportunities to contribute to scholarly publication and build a professional portfolio.[13]

Challenges and Implementation Barriers

Despite its strengths, this strategy faces several challenges. Students' initial methodological literacy may vary, posing difficulties especially without adequate preparatory support. Time and resource constraints are common, particularly when implemented within a single semester alongside other academic demands. Field access, research permissions, and ethical considerations also require careful coordination and institutional backing.

Data quality and analytical rigor are critical concerns. Without intensive supervision, students may risk methodological errors or biased interpretations. Additionally, limited availability of qualified supervisors and their workload may affect the effectiveness of mentoring.[14]

Improvement Strategies and Mitigation Measures

To address these challenges, several corrective strategies can be implemented. Modularizing the learning phases allows the research process to be broken into manageable units, potentially distributed across semesters. Early capacity-building workshops on research methodology, ethics, and data analysis are essential to establish a strong foundation before fieldwork begins.[15,16]

Cross-institutional and interdisciplinary collaboration can expand mentoring capacity and field access. The use of digital tools, such as survey apps, online learning platforms, and automated statistical software, can improve efficiency and accuracy.[17-19] Integrating this strategy into institutional quality assurance and accreditation systems ensures its sustainability and legitimacy within higher education frameworks.

Potential for Deepening and Expansion

This strategy holds significant potential for further development. Nationally, it can be aligned with the MBKM program as a form of project-based and research-oriented learning.[7] It is also applicable across educational levels, including professional, vocational, and postgraduate programs, with appropriate methodological adjustments.

Establishing student journals and institutional repositories can provide structured platforms for disseminating student research.[20,21] International collaboration, through comparative studies, benchmarking, or joint publications, can enhance the global dimension of this approach. Moreover, integrating ethical, cultural, and sustainability perspectives into problem formulation and analysis will enrich students' understanding and increase the social relevance of their research.

Additional Considerations

The success of this strategy also depends on a fair and comprehensive assessment system. Process- and product-based evaluation allows instructors to assess not only final outputs but also students' cognitive development and teamwork. Reflective documentation, such as learning journals, helps students track and internalize their learning journey.[22]

Alignment with institutional learning outcomes and curriculum frameworks is essential to ensure that this strategy is not perceived as an additional burden but as an integral part of academic development. With institutional policy support, faculty training, and effective monitoring systems, this strategy can become a flagship model for higher education that prioritizes quality, relevance, and sustainability.

CONCLUSION

The serial, practice-based research learning model offers a transformative approach to undergraduate research education. It empowers students to become active researchers, enhances methodological literacy, and promotes the integration of academic learning with societal relevance. Institutions seeking to strengthen research capacity and student engagement may find this model a valuable addition to their curriculum.

Ethical consideration, competing interest and source of funding

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