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Investigative Mentorship and Formative Research in University Students

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Abstract: This article examines investigative mentorship and formative research as pedagogical mechanisms to strengthen the scientific autonomy of university students in advanced stages of their degree programs. Drawing from the underlying thesis, it analyzes indicators related to methodological tutoring, monitoring, feedback, thesis completion support, critical thinking, inquiry-based activities, and the integration of theory with practice. A progressive model is proposed that shifts students from an initial state of dependency toward greater autonomy in problem formulation, source selection, methodological decision-making, and data interpretation. The study integrates recent literature and evaluation criteria for academic outputs, highlighting the value of combining surveys with document analysis. No institutional empirical results are presented; the contribution is conceptual and methodological, aimed at establishing a foundation for future interventions and correlational studies in higher education.

Keywords: investigative mentorship; formative research; tutoring; autonomy; critical thinking; higher education

Introduction

University research training tends to concentrate heavily on the final stages of study, when students are required to draft project proposals, reports, or graduation theses. This concentration creates a fundamental paradox: scientific autonomy is expected at the exact moment when many students face complex methodological decisions for the first time. Formative research and faculty mentorship can bridge this gap if implemented as progressive processes rather than late-stage interventions. The underlying thesis frames investigative mentorship as a core dimension of teaching competencies, operationalizing it through methodological tutoring, project guidance, progress tracking, scientific feedback, and degree-completion support. Furthermore, it incorporates the integration of research into teaching through inquiry-based activities, critical thinking development, and the articulation between theory and practice. These dimensions provide a framework to examine scientific training as a continuous pedagogical process. The purpose of this article is to expand the model of investigative mentorship and explain its potential relationship with student autonomy and the quality of academic outputs. The underlying premise is that mentorship does not imply substituting student decisions, but rather provides the necessary structure, evaluative criteria, and iterative feedback until students can progressively assume greater independence.

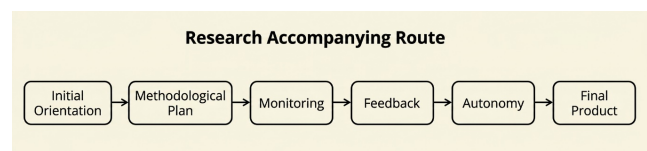


Figure 1. Conceptual route of research accompaniment from orientation to autonomy

Research Mentorship as a Teaching Competency Research tutoring is a complex practice because it combines methodological knowledge, communication skills, and pedagogical judgment. The instructor must assess the student's level of progress, identify conceptual

errors, formulate reflective questions, and determine when to provide direct answers versus when to return decision-making responsibility to the student. Methodological tutoring provides structure to the research process. In its early stages, it helps delimit a problem, ensure coherence between objectives and methodology, select sources, and organize a work plan. However, if it remains directive throughout the entire process, it risks fostering dependency. As shown in Table 1, the quality of mentorship is tied to the ability to adjust the level of support to the student's evolving needs and progress. Progress tracking serves both academic management and a metacognitive function. Establishing intermediate milestones enables the early detection of difficulties, distributes the workload, and encourages periodic reflection on decision-making. Scientific feedback, for its part, must be specific, clear, prioritized, and improvement-oriented, avoiding superficial or extensive corrections that do not explain the criteria behind each change. Degree-completion support becomes particularly critical during the eighth and ninth semesters, as students must integrate accumulated knowledge while meeting institutional standards. High-quality mentorship requires clear agreements on roles, timelines, communication channels, review criteria, and authorship responsibilities. Establishing explicit guidelines reduces conflicts and fosters more consistent learning experience.

Table 1. Matrix of components, risks, and expected outcomes in research mentorship

Component	Faculty Action	Risk if Misapplied	Expected Outcome
Methodological tutoring	Guide problem formulation, objectives, and method	Excessive direction	Methodological coherence
Progress tracking	Review milestones and progress	Bureaucratic control	Process continuity and management
Feedback	Explain strengths, errors, and pathways for improvement	Correction without clear criteria	Learning and argumentative improvement
Degree-completion support	Guide final decision-making and academic standards	Authorship substitution	Autonomy and solid completion

Formative research: research as a learning strategy
Formative research conceives inquiry as an integrated strategy within the curriculum rather than an activity exclusive to professional researchers. [21] highlight its role in linking learning and knowledge construction, while [11] show that the development of research competencies can be strengthened through systematic training experiences. In the classroom, formative research can be operationalized through critical reading of scientific articles, comparison of theoretical frameworks, problem formulation, small-scale data collection and analysis exercises, evidence reviews, structured debates, literature matrix development, and short report writing. The key lies not in transforming every course into a full research project, but in incorporating intellectual practices native to scientific inquiry. These early experiences distribute the cognitive load of

methodological learning across the academic program. When students reach their final graduation thesis having already practiced search strategies, source evaluation, problem definition, and data analysis, tutoring can focus on higher-complexity decisions rather than starting from fundamental concepts. Formative research can also strengthen the connection between theory and practice. A conceptual framework becomes far more meaningful when students use it to interpret a concrete problem. This dynamic fosters critical thinking by requiring students to compare explanations, identify limitations, and justify decisions based on evidence Table 2.

Table 2. Matrix of strategies and competencies in formative research

Strategy	Possible Activity	Stimulated Competency
Critical reading	Compare two articles on the same research problem	Evidence evaluation and argumentation
Problematization	Transform a real-world situation into an investigable question	Delimitation and analytical thinking
Mini-project	Collect and analyze a small dataset	Design and analysis
Evidence-based debate	Defend a position using verifiable sources	Scientific argumentation
Academic writing	Draft a summary, methodology section, or discussion	Scientific communication

From Dependence to Research Autonomy Autonomy should not be understood as the absence of mentorship. Rather, it is the capacity to make justified decisions, recognize limitations, and seek support strategically. During the initial stages of a research trajectory, the student requires greater structure; over time, they can assume partial decision-making responsibilities, and ultimately, demonstrate the ability to defend their work using their own arguments. A progressive model can be organized into four stages. In the first, the instructor models evaluative criteria and explicitly explains the rationale behind decisions. In the second, the student proposes alternatives and receives feedback. In the third, the instructor serves primarily as a critical reviewer. In the fourth, the student defends decisions, acknowledges limitations, and utilizes feedback independently. This approach avoids two extreme positions. The first is abandonment, where the student receives general instructions with minimal ongoing mentorship. The second is over-intervention, where the instructor ends up making key decisions or rewriting products. Both extremes diminish the learning process. Autonomy is strengthened through a gradual transfer of responsibility Table 3.

Table 3. Progression matrix of research mentorship toward autonomy

Stage	Faculty Role	Student Role	Progress Indicator
1. Modeling	Explains criteria and provides examples	Observes, asks questions, and replicates procedures	Understands the core logic
2. Guided practice	Reviews proposals and provides feedback	Proposes partial decisions	Justifies alternatives
3. Supervision	Questions and validates coherence	Makes decisions and reviews work	Corrects errors with reduced dependency
4. Autonomy	Acts as a critical interlocutor	Defends and refines their work	Argumentates effectively and recognizes limitations

Scientific Feedback and Learning Quality Feedback is one of the core mechanisms of research mentorship. To effectively drive learning, it must move beyond superficial corrections and focus on transferable criteria. Merely stating that an introduction is “weak” offers little value; explaining that the research gap lacks support and illustrating what evidence is required enables the student to apply that reasoning to future sections. Effective feedback can be organized by priority: first addressing issues that affect the overall validity or conceptual coherence of the study, followed by argumentative structure, and finally stylistic details. Prioritizing in this manner prevents the student from focusing their efforts on minor formatting tweaks while critical structural flaws persist. It is equally essential to balance direct comments with targeted questions. Well-formulated questions serve to activate critical reflection: *What evidence supports this assertion? How does this method directly address the research question? What alternatives were discarded, and why?*

This type of intervention prompts the student to articulate their rationale explicitly, reducing reliance on overly prescriptive instructions. Academic Product Quality as Process Evidence The thesis proposes assessing the quality of academic products through argumentative coherence, methodological rigor, the use of scientific sources, analytical capacity, and overall solidity. These criteria allow evaluation whether mentorship and formative research are effectively reflected in concrete outputs. Documentary review can employ a rubric with explicit performance levels. Argumentative coherence examines the connection between the research problem, literature, and conclusions; methodological rigor evaluates the consistency among questions, design, techniques, and analysis; the use of sources considers relevance and currency; analytical capacity focuses on interpretation rather than mere description; and overall solidity integrates clarity, consistency, and the project's scope. Combining rubric evaluations with student perceptions yields a more comprehensive analysis. A student may rate the mentorship experience favorably yet produce a weak thesis, or conversely, achieve a solid academic product driven by independent factors. These discrepancies are analytically valuable, helping to identify additional underlying variables that influence the research training process Table 4 .

Table 4. Evaluation rubric for academic products

Criterion	Evaluation Question	Evidence
Argumentative coherence	Do the sections of the work maintain a logical line of reasoning?	Introduction, framework, discussion, and conclusions
Methodological rigor	Does the method address the research problem, and is it properly executed?	Design, sample, instruments, and data analysis
Use of sources	Are claims supported by relevant scientific literature?	References and in-text citations
Analytical capacity	Does it interpret evidence or merely describe it?	Results and discussion sections
Overall solidity	Does the final product consistently achieve its objectives?	Complete manuscript

Institutional Conditions for Mentorship Research mentorship does not depend exclusively on the willingness of the tutor. Faculty workload, number of assigned students, institutional timelines, access to academic databases, and the availability of advisory spaces can either facilitate or constrain the quality of the process. Therefore, any improvement strategy must account for structural conditions. Communities of practice and co-mentorship systems can help distribute methodological expertise and reduce reliance on a single instructor. Mentor training should extend beyond methodological content to encompass academic communication, authorship ethics, conflict management, and effective feedback strategies. Universities can strengthen formative research through student research groups (*semilleros*), academic conferences, repositories of exemplary work, writing workshops, data analysis clinics, and student integration into faculty-led research projects. These initiatives transform research into a shared institutional experience rather than merely a final graduation requirement. Proposal for Mentorship Evaluation Evaluation can combine three primary sources: student perceptions, faculty self-assessment, and academic product reviews. This triangulation makes it possible to identify convergences and discrepancies across the mentorship process. If students report insufficient tracking and their final products consistently present coherence flaws, there is a clear signal for institutional intervention. Conversely, if student satisfaction is high yet academic products remain methodologically weak, it may indicate a need to examine the rigor of feedback or underlying curricular constraints. As illustrated in Figure 2, thesis-derived indicators provide a structured foundation for this evaluation framework. Surveys can capture both the frequency and perceived quality of mentorship, while documentary review records observable product characteristics. The empirical validation phase should focus on testing these instruments and establishing transparent selection criteria for the sampled work.

Proposed Evidence Triangulation

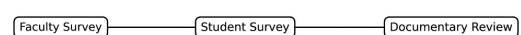


Figure 2. Triangulation of Sources to Evaluate Mentorship and Formative Outcomes

Discussion

The reviewed literature and the proposed thesis model converge in viewing research mentorship as a pedagogical dimension rather than a merely administrative function. Its potential value lies in providing clear criteria and actionable feedback throughout the process, while formative research distributes inquiry-based experiences across the curriculum. The progressive autonomy model offers a useful framework: the quality of mentorship is not measured by the sheer volume of faculty interventions, but by its capacity to foster increasingly independent decision-making. This perspective can shift institutional practices away from rewarding intensive, line-by-line correction toward prioritizing actual learning. The lack of primary empirical data represents the main limitation of this study. Consequently, this paper formulates evaluation mechanisms and criteria that must later be empirically tested through surveys and academic product reviews within the target population.

Conclusions

Research mentorship and formative research are complementary dimensions: the former structures provides feedback for concrete processes, while the latter creates continuous opportunities to learn how to conduct research. Together, they can foster a transition from student dependence toward scientific autonomy. Evaluating these practices requires combining perception with documentary evidence and accounting for institutional conditions. The quality of mentorship cannot be inferred solely from student satisfaction, nor can the quality of an academic product be attributed exclusively to the tutor. The proposed framework provides a conceptual and methodological roadmap for future research in advanced higher education cycles, as well as for the design of institutional policies aimed at strengthening mentorship programs.

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