



Bridging the Epistemological Gap: Scaffolding Action Research for Educational Practitioners and Students through a Structured Workbook

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ABSTRACT

Despite a substantial body of literature emphasizing the value of practitioner-led action research (AR) for professional growth and educational improvement, in-service teachers and education students (pre-service to postgraduate) consistently demonstrate low rates of independent research engagement. This paper argues that this gap reflects not merely systemic barriers such as time scarcity and limited institutional support, but a cognitive-procedural deficit: novice researchers lack the structured scaffolding needed to translate abstract AR methodology into concrete classroom inquiry. Drawing on Vygotskian scaffolding theory, Merrill's First Principles of Instruction, and Cognitive Load Theory, this paper describes the design and development of an Action Research Workbook that integrates the iterative Plan-Act-Observe-Reflect cycle of AR with structured instructional design principles such as ADDIE and the Successive Approximation Model (SAM). Each workbook chapter follows a consistent five-part sequence (Purpose, Example of Writing, Guiding Questions, Footnote Guide and Writing Space, and Reflection Prompts) intended to reduce procedural uncertainty for novice researchers. The workbook's structure was developed through document analysis of established action research manuals and refined through expert review by approximately ten university lecturers in educational research, curriculum development, instructional design, and teacher education, and is currently undergoing pilot implementation with Master of Science Education students. This paper contributes a theoretically grounded, practice-oriented design account intended to inform future empirical evaluation of structured scaffolding tools for practitioner research. The workbook further situates practitioner inquiry within its ethical dimensions, addressing the dual-role conflict practitioners face when studying their own classrooms and embedding reflection prompts that foster guided reflexivity. Findings from the ongoing pilot implementation are expected to inform future large-scale effectiveness studies across diverse educational settings.

Keywords: action research, instructional scaffolding, instructional design, teacher professional development, cognitive load theory

INTRODUCTION

The Epistemological Divide: Universal Theory vs. Local Practice

The landscape of educational research features a long-standing epistemological divide between traditional empirical inquiry and practitioner-led action research (AR). Traditional educational research, deeply anchored in positivist and post-positivist traditions, operates primarily within an extractive and generalizing paradigm. In this top-down model, external academic investigators study educational phenomena from the outside with the goal of isolating variables, establishing causal relationships, and generating universal, context-free theories that can be scaled across diverse educational ecosystems (Biesta, 2007; Gage, 1989). While this macro-level inquiry has contributed significantly to overarching educational policy and learning theory, it frequently falls victim to what Schön (1983) conceptualized as the rigor-relevance dilemma. Theoretical models generated in controlled

or generalized environments often struggle to account for the dynamic, highly contextual, and unpredictable realities of the daily classroom (Vanderlinde & van Braak, 2010).

In contrast, action research is grounded in a praxis-oriented epistemology that prioritizes local, situated knowledge (Kemmis, McTaggart, & Nixon, 2014; Lewin, 1946). Rather than pursuing decontextualized laws of learning, AR empowers educators to systematically investigate their own immediate pedagogical environments to diagnose specific learning impediments and enact localized interventions (Mertler, 2020; Stenhouse, 1975). This divergence represents more than a choice of methodology; it represents a fundamental clash of knowledge domains. As Cochran-Smith and Lytle (1999) distinguish, traditional research produces "knowledge for practice," which is formal theory generated by external researchers for teachers to implement, whereas action research generates "knowledge of and in practice," which is situated inquiry generated by teachers through systematic reflection on their own clinical work. In contemporary educational ecosystems, bridging this epistemological chasm is critical to transforming schools into self-improving, research-informed learning organizations (Cain, 2019).

The Practitioner's Dilemma: High Vitality vs. Low Productivity

Despite the theoretical consensus surrounding the value of localized inquiry, the teaching profession faces a profound structural paradox, which we term the Practitioner's Dilemma. A robust body of literature consistently underscores that action research is vital for continuous pedagogical improvement, teacher professional agency, and closing the gap between academic theory and classroom practice (Borg, 2010; Cochran-Smith & Lytle, 2009; Hattie, 2009). When educators engage in systematic AR, they transition from passive technicians executing mandated curricula to reflective practitioners capable of generating empirical evidence to refine their instruction (Zeichner, 2003).

Paradoxically, empirical data reveals that actual research productivity and sustained empirical engagement among in-service teachers and education students (pre-service to postgraduate) remain exceptionally low (Perines, 2021). While action research is frequently mandated in initial teacher education (ITE) programs and professional development workshops, most educators do not independently initiate, sustain, or publish research once embedded in school environments (Luan, Guo, & Yang, 2020). For education students at every level, from pre-service to postgraduate, AR is often perceived as an ephemeral, compliance-driven academic hurdle rather than an enduring professional stance. For in-service practitioners, classroom innovations and interventions are rarely documented, systematically analyzed, or shared beyond the immediate classroom walls. Consequently, the transformative potential of action research remains largely trapped in academic discourse, failing to materialize as a widespread, self-sustaining clinical practice.

Identifying the Barriers: Beyond Systemic Friction to Cognitive-Procedural Deficits

To resolve the Practitioner's Dilemma, the educational community must re-evaluate the explanations traditionally assigned to teacher research dormancy. The prevailing literature overwhelmingly attributes the low rates of practitioner research to administrative and structural impediments, specifically time scarcity, heavy teaching loads, lack of institutional funding, and an absence of leadership support (Borg, 2010; Elliott, 2015). While these systemic frictions are undeniably real, treating them as the primary etiology obscures a far more pervasive challenge: a profound cognitive and procedural barrier.

Educational practitioners and education students are historically socialized by educational systems to function as consumers of knowledge rather than producers of empirical inquiry. Asking an educator to transition from a classroom instructor to a systematic investigator imposes a massive cognitive load and introduces severe procedural uncertainty (Sweller, 1988; Vanderlinde & van Braak, 2010). When educators attempt action research, they routinely encounter three critical cognitive-procedural hurdles:

- **The Abstraction Trap:** Standard research methodology textbooks are written from an academic, theoretical perspective. They offer complex definitions of qualitative and quantitative designs that do not translate cleanly into the iterative, rapid-cycle realities of classroom teaching (Neethling & Nel, 2021; Cabaroglu, 2014; Lodico et al., 2010).



- **Procedural Inertia:** Practitioners frequently struggle with the micro-mechanics of the research workflow, such as converting a broad classroom grievance into a testable research question, designing lightweight formative data collection tools that do not disrupt daily teaching, and coding qualitative student data without specialized software (Zhou et al., 2024; Mishore & Abate, 2023; Solis & Gordon, 2019).
- **The Scaffolding Deficit:** Drawing on Vygotsky's (1978) Zone of Proximal Development (ZPD) and instructional scaffolding theory (Wood, Bruner, & Ross, 1976), novice researchers require temporary, structured support to master complex tasks. Currently, educators attempting AR operate in an unassisted space without structured tools to navigate the procedural complexity of research design, routinely suffering from a lack of institutional scaffolding, structured guidelines, and specialized research mentorship (Eder, 2026; Goodman et al., 2025; Gutiérrez-Braojos et al., 2024).

Without explicit, step-by-step procedural scaffolding that demystifies the mechanics of classroom inquiry, the cognitive cost of initiating and completing an action research cycle remains high. This cognitive overload is a primary catalyst for the abandonment of practitioner research.

To dismantle these cognitive and procedural barriers, there is a need to shift from merely advocating for action research to actively supporting it through designed pedagogical artifacts. This paper describes the development of an Action Research Workbook grounded in instructional design principles, specifically engineered for dual use by in-service educational practitioners and education students from pre-service to postgraduates, which is currently undergoing evaluation.

Evidence-Based Comparison with Existing Literature

To contextualize the distinct utility of the Action Research Workbook, it must be positioned relative to dominant educational manuals. Rather than functioning as a conceptual textbook, this resource addresses the practical deficits of conventional literature:

Table 1. Comparison on Current References and Manual for Conducting Action Research

Reference / Manual	Core Rationale & Characteristics	Scaffolding Focus
MoE Manual	Official framework; explains institutional protocols and cyclical reporting stages.	Institutional compliance and alignment metrics.
McNiff (2013 text tradition)	Deeply philosophical; positions AR as a personal moral commitment and generative theory.	Epistemological orientation and ideological stance.
Mills (2019 text tradition)	Evaluative guide; focuses on teacher-led classroom research, data analysis types, and action plans.	Conceptual understanding of data methodologies.
McAteer (2013)	Comprehensive manual; uses illustrative practitioner case studies to explore interpretive paradigms of change.	Comprehensive reading and critical study evaluation.
Action Research Workbook	Applied instructional tool; structures a sequential drafting template using localized prompts and examples.	Direct, step-by-step composition and execution.



Unlike conventional methodology textbooks that describe research abstractly, the developed resource is an Action Research Workbook that guides novice action researchers through the action research process using guided questions, writing prompts, worked examples, explanatory notes, and reflective activities. By decomposing the cyclical action research process of planning, acting, observing, and reflecting (Kemmis et al., 2014) into structured guiding questions, worked examples, explanatory footnotes, and reflective writing prompts, the Action Research Workbook bridges the epistemological divide between universal theory and localized practice.

Conceptual and Practical Contributions

This paper contributes to the fields of teacher professional development and instructional design by:

- Proposing a structured Action Research Workbook explicitly developed to scaffold novice action researchers through localized classroom inquiry.
- Integrating the reflective cycles of action research with the systematic structure of instructional design principles.
- Presenting an Action Research Workbook refined through expert review to support novice action researchers.

Foundational Theories

Action Research Frameworks

Action Research (AR) is fundamentally anchored in iterative inquiry designed to bridge the gap between theory and practice. The methodological landscape of AR is traditionally centered around canonical frameworks, most notably the classic model introduced by Kemmis and McTaggart, which conceptualizes the research process as a continuous spiral of four distinct phases: Plan, Act, Observe, and Reflect (Kemmis et al., 2014). Within this structure, participants identify a context-specific problem, execute targeted interventions, systematically gather empirical observations, and critically reflect upon the outcomes to initiate subsequent cycles. Rather than following a rigid, linear path, AR is inherently cyclical and iterative (Feekery, 2023). This recursive framework means that insights gained during the observation and reflection phases naturally feed back into a refined planning stage, establishing an ongoing spiral of spirals that allows the research focus to evolve alongside the practitioner's expanding operational knowledge.

Instructional Design (ID) as the Missing Link

Despite the theoretical appeal of action research, its implementation often presents significant hurdles for novice researchers who struggle to translate broad reflective cycles into concrete, actionable interventions. To resolve this challenge and make AR truly accessible, the research process must be treated fundamentally as an instructional problem. Instructional Design (ID) principles serve as a key connection by shifting the focus from abstract inquiry to the systematic creation of outcome-focused learning experiences (Drljača et al., 2024).

Historically established to optimize curriculum delivery, traditional systems-based approaches provide empirical guidelines that accurately align target learning conditions, explicit behavioral objectives, and measurable assessments (Dick, Carey, & Carey, 2022; Spatioti et al., 2022). By introducing structured ID methods into the action research paradigm, practitioners gain the pedagogical tools necessary to design reliable learning materials and targeted classroom strategies, transforming open-ended experimentation into an intentional learning solution.

The Theoretical Intersection

The integration of action research with instructional design frameworks establishes a powerful theoretical intersection that addresses the limitations of either approach in isolation. Merging the reflective, problem-solving cycles of AR with systematic ID frameworks, such as the structured ADDIE (Analysis, Design, Development,



Implementation, Evaluation) model or the agile Successive Approximation Model (SAM), provides the framework required to guide novices through complex pedagogical interventions (Omoregie et al., 2025).

As highlighted by recent analyses of instructional models, intersecting detailed linear frameworks with rapid, iterative feedback loops ensures both structural rigor and adaptability (Martin & Ritzhaupt, 2021; Omoregie et al., 2025). Intersecting these ID workflows with the foundational AR spiral allows practitioners to operate within a structured yet flexible environment. Novice researchers can rapidly prototype learning materials, deploy them in real-world settings, evaluate their impact, and implement continuous improvements without losing sight of the core research objectives.

THE ACTION RESEARCH WORKBOOK DESIGN

Development Methodology and Rationale

The structural organization of the Action Research Workbook was developed through document analysis of national action research manuals, instructional design literature, teacher education resources, and practitioner guides. Sources were purposively selected based on their currency, relevance to novice practitioner-researchers, and prior use within Malaysian and comparable teacher education contexts. Each source was examined to identify recurring structural elements, such as guiding questions, worked examples, and reflective components, which were then tabulated, compared across sources, and coded for frequency and consistency of use. Elements that recurred across multiple sources and aligned with the study's theoretical framework (Vygotskian scaffolding, Merrill's First Principles of Instruction, and Cognitive Load Theory) were prioritized for inclusion, while elements specific to a single source or inconsistent with the workbook's procedural-clarity rationale were excluded. These synthesized elements were then reorganized into a coherent workbook framework before proceeding to expert review and content refinement. The design rationale explicitly prioritizes procedural clarity over academic density, choosing features that directly translate into localized teacher agency.

Following the preliminary development of the Action Research Workbook, the draft underwent expert review involving approximately ten university lecturers with expertise in educational research, curriculum development, instructional design, and teacher education. Experts were selected based on their relevant academic or professional experience in at least one of these domains. To ensure a comprehensive evaluation, two experts independently reviewed each workbook chapter using a structured evaluation form combining rating items and open-ended comments. The review focused on content relevance, conceptual clarity, instructional sequencing, and alignment with the principles of action research, with reviewers rating each chapter against these criteria and providing written justification for any item rated below an acceptable threshold. Ratings and comments from both reviewers of each chapter were compared, and any discrepancies were resolved by consolidating reviewer feedback into a single revision item, which the authors then addressed and documented. This iterative process of review, consolidation, and revision continued until all chapters met the agreed evaluation criteria, informing revisions to improve the accuracy, clarity, and usability of the Action Research Workbook before it proceeded to pilot implementation with Master's students.

The Workbook Development Lifecycle

To communicate the structural evolution and maturity of the project transparently, the development phases are mapped from inception through future empirical target studies:

Table 2. Status of the Action Research Workbook

Development Phase	Current Status
LITERATURE REVIEW	Completed
Workbook Design	Completed

Expert Review	Completed
Content Refinement	Completed
Pilot Testing	Ongoing
Large-Scale Evaluation	Future Work



Figure 1. Methodological development and evaluation lifecycle of the Action Research Workbook.

Scaffolding the Inquiry Journey

Rather than merely delineating a rigid succession of static workbook chapters, a robust design paper must articulate how a support tool functions pedagogically to transform the teacher-researcher experience. At the heart of this workbook structure is the concept of scaffolding, defined as the provision of temporary linguistic and cognitive frameworks that support learners as they navigate tasks just beyond their independent capabilities (Van de Pol et al., 2010). For novice researchers, the open-ended nature of action research can be paralyzing, often leading to methodological drift or anxiety.

By embedding explicit prompts, worked examples, and guiding questions directly into the text, the tool serves as a structured learning support that functions as a vital external stabilizer within professional development resources, assisting the user through complex academic composition (Belland, 2014). Critically, this design

provides consistent scaffolding throughout the Action Research Workbook, ensuring steady and reliable formatting aids that remain present for the practitioner as they build internal competence and independent researcher agency (Puntambekar & Hubscher, 2005; Van de Pol et al., 2010).

To maintain this support and ensure clear scannability, every single chapter within the Action Research Workbook structure follows a strict, predictable structural sequence:

- **Purpose:** A brief, clear statement establishing why the current research section matters and what it achieves in the broader study.
- **Example of Writing:** A concrete text excerpt demonstrating how a successful researcher drafts this specific section.
- **Guiding Questions:** Diagnostic prompts designed to extract critical analytical reflections regarding the practitioner's own classroom.
- **Footnote Guide:** Small, targeted annotations placed alongside writing sections to clear up immediate procedural doubts.
- **Writing Space:** Dedicated, non-templated text fields labeled [Write here] that invite direct writing input.
- **Reflection Prompts:** Metacognitive questions situated at the end of each module to assess personal growth and pedagogical alignment.



Figure 2. Modular sequencing framework embedded within each chapter of the Action Research Workbook.

This specific progression ensures that the student or teacher is never left with an unguided layout, allowing them to systematically build out sections of their report within a transparent workbook structure.

Applying First Principles

To move beyond passive compliance and foster deep conceptual understanding, the operational flow of the Action Research Workbook is explicitly rooted in evidence-based frameworks, such as Merrill's First Principles of Instruction (Merrill, 2002, 2012). Merrill posits that learning is optimized when it is problem-centered. The



Action Research Workbook operationalizes Merrill primarily through activation, demonstration via examples, and application through guided writing, rather than claiming a full implementation of all original phases:

- **Activation:** The tool deliberately activates the teacher's prior pedagogical knowledge and classroom experiences, allowing them to anchor new methodological practices into established mental schemas (Lo & Hew, 2017).
- **Demonstration via Examples:** Rather than relying on abstract, theoretical definitions of research paradigms, the workbook demonstrates what action research looks like in practice. This is achieved by embedding contextualized, real-world narratives of other teachers navigating the AR spiral to serve as explicit worked examples, helping to clarify schema acquisition (Kirschner et al., 2006).
- **Application through Guided Writing:** Immediate application opportunities are woven into every phase. Following the sequential workflow structure, which begins with a clear purpose, moves into an example paragraph, shifts to guiding questions, and concludes with an active writing activity, practitioners immediately map these demonstrated concepts directly onto their unique classroom challenges. This shifts the Action Research Workbook into an active space for practitioner inquiry (Merrill, 2002).

Managing Cognitive Load

The transition from raw data collection to systematic data analysis represents a significant cognitive hurdle that frequently challenges novice teacher-researchers. Grounded in Cognitive Load Theory (CLT), this stage involves high element interactivity, meaning practitioners must simultaneously manage multiple data streams, interpret qualitative nuances, and maintain methodological alignment. This process can easily challenge the limited processing capacity of human working memory (Sweller et al., 2019; Sweller, 2010). Modern advancements in CLT emphasize that explicitly structuring external text fields and clear segmentations can minimize extraneous processing loads when handling domain-specific data layouts (Sweller, 2025).

To alleviate this extraneous burden, the Action Research Workbook reduces cognitive load through straightforward, practical features: clear chapter organization, sequential guidance, guiding questions, example paragraphs, and extensive footnote explanations. Rather than introducing abstract sorting metrics, the workbook provides simple, structured writing spaces and guided recording sections. By organizing qualitative observations, student artifacts, and basic survey inputs into fixed, predictable sections, these textual tools reduce the procedural uncertainty and mental processing required to organize complex datasets (Paas & van Merriënboer, 2020). This formatting helps reduce procedural uncertainty by providing structured guidance throughout each chapter, freeing up working-memory resources so that teacher-researchers can dedicate their germane cognitive resources to discovering helpful insights within their data (Sweller et al., 2019).

ETHICAL COMPLEXITIES AND POSITIONALITY

The "Dual-Role" Conflict

Conducting practitioner research within one's own educational environment introduces unique institutional friction, primarily manifest in the dual-role conflict of the teacher-researcher. Practitioners who act as insider researchers are simultaneously tasked with two distinct professional obligations: the ethical imperative to care for and objectively instruct their students, and the methodological drive to evaluate those same students as research participants (Floyd & Arthur, 2012). This duality fundamentally shapes traditional researcher-participant dynamics by accentuating inherent institutional power imbalances. Students, recognizing the teacher as the primary evaluator and grading authority, may feel an implicit pressure to conform or perform, potentially compromising the voluntariness of their participation and the authenticity of qualitative data (Nolen & Putten, 2007). Without clear structural boundaries, the dual role risks blurring the lines between routine instructional assessment and formal empirical data collection, creating ethical vulnerabilities regarding informed consent, student privacy, and evaluation bias (Coghlan & Brydon-Miller, 2014).



Guided Reflexivity

To navigate these ethical tensions, a successful design framework must deliberately move beyond mechanical procedural compliance and actively foster guided reflexivity. The Action Research Workbook does not simply treat ethics as a bureaucratic checklist; instead, it serves as a helpful tool that prompts educators to systematically interrogate their own positionality, implicit biases, and systemic assumptions (Attia & Edge, 2017). By embedding explicit reflection prompts throughout the research cycle, the framework guides the practitioner away from operating as a detached, objective investigator who imposes top-down structural interventions upon a passive classroom. Instead, it assists them to become a facilitator of student-centered learning who views students as active participants in the learning environment (Edwards-Groves & Rönnerman, 2021). This ongoing process of critical self-scrutiny helps ensure that the teacher-researcher remains aware of how their institutional authority shapes both the classroom interventions and the subsequent data analysis, supporting opportunities for responsive pedagogy (Burns, 2010).

LIMITATIONS AND FUTURE RESEARCH

While the developed framework establishes a robust, accessible pathway for novice researchers, it is important to recognize its scope and boundaries. The Action Research Workbook currently emphasizes structured textual guidance rather than advanced visual scaffolding tools such as decision trees, workflow maps, or interactive reflective matrices. The current version prioritizes textual clarity, sequential guiding questions, and clear written exemplars to keep the layout clean and accessible. Consequently, users looking for highly graphic sorting tools or dynamic digital dashboards may find the purely textual format linear.

Furthermore, although the workbook has undergone expert review to strengthen content quality, empirical evidence regarding usability and instructional effectiveness is still being generated. The claims advanced in this paper regarding improved research engagement, reduced cognitive burden, and enhanced methodological understanding are therefore theoretically derived from the underlying scaffolding, instructional design, and cognitive load frameworks rather than demonstrated through pilot data, and should be interpreted as design hypotheses pending empirical confirmation. The revised workbook is currently undergoing pilot implementation with Master of Science Education students to examine its usability, practicality, and implementation within postgraduate teacher education.

Beyond the ongoing pilot, future research should conduct dedicated empirical evaluations of the Action Research Workbook using quantitative, qualitative, or mixed-methods approaches to determine its effectiveness in improving research competence and engagement among novice researchers. A quasi-experimental or single-group pre- and post-intervention design could measure changes in participants' confidence in conducting independent research, their methodological understanding of the action research cycle, and their demonstrated ability to plan, conduct, and report action research independently, using validated instruments administered before and after workbook use. Qualitative approaches, such as semi-structured interviews, reflective journals, or analysis of participants' completed workbook entries, could complement these quantitative measures by illuminating how users experience and apply the workbook's scaffolding features in authentic classroom settings. A mixed-methods design combining both strands would allow triangulation between measured outcomes and users' lived experience of the tool. Future studies should evaluate usability, practicality, user satisfaction, and instructional effectiveness using larger samples across diverse educational settings.

CONCLUSION

The persistent epistemological divide between universal, top-down educational theory and localized classroom practice cannot be bridged by merely urging teachers to become researchers. As long as standard research methodologies remain trapped in academic abstraction, the Practitioner's Dilemma will endure, leaving action research as an ephemeral box-ticking exercise rather than a sustainable clinical practice. By reframing this challenge not as a systemic failure of time scarcity, but as a solvable cognitive-procedural challenge, this paper proposes a tangible intervention in the form of a structured, guided instructional resource.



By intersecting the iterative spiral of action research with the structured formatting of instructional design frameworks like ADDIE and SAM, the workbook structure transforms open-ended, intimidating experimentation into a series of predictable, manageable phases. Rooted in key tenets of Merrill's First Principles of Instruction and Cognitive Load Theory, the tool intentionally helps reduce procedural uncertainty through clear guided recording sections, contextualized worked examples, and consistent scaffolding. Furthermore, by embedding reflection prompts directly into its operational flow, the Action Research Workbook helps equip educators to navigate the ethical, dual-role complexities inherent in insider research, shifting their positionality from institutional authorities to responsive facilitators of learning.

The Action Research Workbook has progressed beyond conceptual development and is currently undergoing pilot testing following expert review and content refinement. Ultimately, supporting research production within contemporary educational ecosystems relies on the deployment of intentional, evidence-based pedagogical artifacts. When education students at every level and in-service practitioners are provided with the necessary workbook structure to support their inquiry, teachers are better positioned to become active producers of evidence-informed classroom knowledge. Findings from the ongoing pilot implementation will inform subsequent refinement of the workbook and provide the basis for future effectiveness studies involving broader educational contexts.

Ethical Approval

Expert review of the Action Research Workbook and the ongoing pilot implementation with Master of Science Education students involved the voluntary participation of university lecturers and postgraduate students, who provided informed consent prior to participation.

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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REFERENCES

1. Attia, M., & Edge, J. (2017). Be(com)ing a reflexive researcher: a developmental approach to research methodology. *Open Review of Educational Research*, 4(1), 33-45. <https://doi.org/10.1080/23265507.2017.1300068>
2. Belland, B. R. (2014). Scaffolding: Definition, Core Characteristics, and Theoretical Frameworks. In *Instructional Scaffolding in STEM Education* (pp. 17-44). Springer, New York, NY. https://doi.org/10.1007/978-1-4614-8842-2_2
3. Biesta, G. (2007). Why "what works" won't work: Evidence-based practice and the democratic deficit in educational research. *Educational Theory*, 57(1), 1-22. <https://doi.org/10.1111/j.1741-5446.2006.00241.x>
4. Borg, S. (2010). Language teacher research engagement. *Language Teaching*, 43(4), 391-429. <https://doi.org/10.1017/S0261444810000170>
5. Burns, A. (2010). *Doing Action Research in English Language Teaching: A Guide for Practitioners*. Routledge.
6. Cabaroglu, N. (2014). Re-visiting the theory and practice gap through the lens of student teacher dilemmas. *Australian Journal of Teacher Education*, 39(2), 89-109. <https://doi.org/10.14221/ajte.2014v39n2.10>
7. Cain, T. (2019). *Becoming a research-informed school: Why? What? How?* Routledge.



8. Cochran-Smith, M., & Lytle, S. L. (1999). Relationships of knowledge and practice: Teacher learning in communities. *Review of Research in Education*, 24(1), 249-305. <https://doi.org/10.3102/0091732X024001249>
9. Cochran-Smith, M., & Lytle, S. L. (2009). *Inquiry as stance: Practitioner research for the next generation*. Teachers College Press.
10. Coghlan, D., & Brydon-Miller, M. (2014). *The SAGE Encyclopedia of Action Research*. SAGE Publications Ltd. <https://doi.org/10.4135/9781446294505>
11. Dick, W., Carey, L., & Carey, J. O. (2022). *The systematic design of instruction* (9th ed.). Pearson.
12. Drljača, D. P., Tomić, S., & Ris, K. (2024). Benchmarking Instructional Design Models - ADDIE Wins. *EMC Review - Časopis za ekonomiju - APEIRON*, 28(2), 688-696. <https://doi.org/10.7251/emc2402688d>
13. Eder, M. (2026). Empowering educators through research: Methods, critique, and classroom application. *Acta Pedagogica Asiana*, 5(2), 175-199. <https://doi.org/10.53623/apga.v5i2.1114>
14. Edwards-Groves, C., & Rönnerman, K. (2021). *Generative Practice: A Professional Learning Architecture for Action Research in Education*. Springer Singapore. <https://doi.org/10.1007/978-981-16-0155-2>
15. Elliott, J. (2015). Educational action research as the quest for virtue in teaching. *Educational Action Research*, 23(1), 4-15. <https://doi.org/10.1080/09650792.2014.994017>
16. Feekery, A. (2023). The 7 C's framework for participatory action research: inducting novice participant-researchers. *Educational Action Research*, 32(2), 332-347. <https://doi.org/10.1080/09650792.2023.2234417>
17. Floyd, A., & Arthur, L. (2012). Researching from within: external and internal ethical considerations. *International Journal of Research & Method in Education*, 35(2), 171-180. <https://doi.org/10.1080/1743727X.2012.670481>
18. Gage, N. L. (1989). The paradigm wars and their aftermath: A "historical" sketch of research on teaching since 1989. *Educational Researcher*, 18(7), 4-10.
19. Goodman, B., Nam, A., Yembergenova, A., Nuta, O., & Malone, K. (2025). 'I should conduct action research more often': Teacher educators' professional development through action research. *Educational Action Research*, 33(1), 1-18. <https://doi.org/10.1080/09650792.2025.2468958>
20. Gutiérrez-Braojos, C., Rodríguez-Chirino, P., Pedrosa Vico, B., & Rodríguez Fernández, S. (2024). Teacher scaffolding for knowledge building in the educational research classroom. *RIED-Revista Iberoamericana de Educación a Distancia*, 27(2), 245-266. <https://doi.org/10.5944/ried.27.2.38969>
21. Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge.
22. Kemmis, S., McTaggart, R., & Nixon, R. (2014). *The Action Research Planner: Doing Critical Participatory Action Research*. Springer Singapore. <https://doi.org/10.1007/978-981-4560-67-2>
23. Kirschner, P. A., Sweller, J., & Clark, R. E. (2006). Why Minimal Guidance During Instruction Does Not Work: An Analysis of the Failure of Constructivist, Discovery, Problem-Based, Experiential, and Inquiry-Based Teaching. *Educational Psychologist*, 41(2), 75-86. https://doi.org/10.1207/s15326985ep4102_1
24. Lewin, K. (1946). Action research and minority problems. *Journal of Social Issues*, 2(4), 34-46. <https://doi.org/10.1111/j.1540-4560.1946.tb02295.x>
25. Lo, C. K., & Hew, K. F. (2017). Using "First Principles of Instruction" to Design Flipped Classrooms in Technological Education. *Journal of Educational Technology & Society*, 20(1), 181-196.
26. Lodico, M. G., Spaulding, D. T., & Voegtler, K. H. (2010). *Methods in educational research: From theory to practice* (2nd ed.). Jossey-Bass.
27. Luan, L., Guo, F., & Yang, L. (2020). Challenges and strategies in action research: A meta-synthesis of Chinese EFL teachers' experiences. *System*, 95, 102377. <https://doi.org/10.1016/j.system.2020.102377>
28. Martin, F., & Ritzhaupt, A. D. (2021). Standards and competencies for instructional design and technology professionals. In J. K. McDonald & R. West (Eds.), *Design for Learning*. EdTech Books.
29. McAteer, M. (2013). *Action research in education*. SAGE Publications / BERA.
30. McNiff, J. (2013). *Action research: Principles and practice* (3rd ed.). Routledge.
31. Merrill, M. D. (2002). First Principles of Instruction. *Educational Technology Research and Development*, 50(3), 43-59. <https://doi.org/10.1007/BF02505024>
32. Merrill, M. D. (2012). *First Principles of Instruction*. John Wiley & Sons.



33. Mertler, C. A. (2020). *Action research: Improving schools and empowering educators* (6th ed.). SAGE Publications.
34. Mills, G. E. (2019). *Action research: A guide for the teacher researcher* (6th ed.). Pearson.
35. Mishore, E., & Abate, T. (2023). Difficulties pre-service science teachers encountered in conducting research projects at teacher education college. *Cogent Education*, 10(1), Article 2196289. <https://doi.org/10.1080/2331186X.2023.2196289>
36. Neethling, M., & Nel, M. (2021). Addressing a theory-practice gap in teacher education by using a participatory action learning and action research (PALAR) approach. *South African Journal of Education*, 41(4), 1-12. <https://doi.org/10.15700/saje.v41n4a1942>
37. Nolen, A. L., & Putten, J. V. (2007). Action Research in Education: Addressing Gaps in Ethical Policy and Practice. *Educational Researcher*, 36(7), 401-407. <https://doi.org/10.3102/0013189X07309629>
38. Omoregie, I., Anthony, H., & Braimoh, J. J. (2025). Comparative Analysis of Instructional Models for Designing Effective Online Courses: ADDIE, SAM, and Dick & Carey Approaches. *Journal of Languages and Translation*, 5(1), 33-45. <https://doi.org/10.70204/jlt.v5i1.428>
39. Paas, F., & van Merriënboer, J. J. G. (2020). Cognitive-Load Theory: Methods to Manage Working Memory Load in the Learning of Complex Tasks. *Current Directions in Psychological Science*, 29(4), 394-398. <https://doi.org/10.1177/0963721420922183>
40. Perines, H. (2021). The challenges of educational research in teachers' training: A systematic review. *International Journal of Educational Research Open*, 2, 100028. <https://doi.org/10.1016/j.ijedro.2021.100028>
41. Puntambekar, S., & Hubscher, R. (2005). Tools for Scaffolding Students in a Complex Learning Environment: What Have We Gained and What Have We Missed? *Educational Psychologist*, 40(1), 1-12. https://doi.org/10.1207/s15326985ep4001_1
42. Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. Basic Books.
43. Solis, R., & Gordon, S. (2019). Supervisor facilitation of action research: Fostering teacher inquiry. *Journal of Practitioner Research*, 4(2), Article 3. <https://doi.org/10.5038/2379-9951.4.2.1114>
44. Spatioti, A. G., Kazanidis, I., & Pange, J. (2022). A Comparative Study of the ADDIE Instructional Design Model in Distance Education. *Information*, 13(9), 402. <https://doi.org/10.3390/info13090402>
45. Stenhouse, L. (1975). *An introduction to curriculum research and development*. Heinemann.
46. Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science*, 12(2), 257-285. https://doi.org/10.1207/s15516709cog1202_4
47. Sweller, J. (2010). Element Interactivity and Intrinsic Cognitive Load. *Educational Psychology Review*, 22(2), 123-138. <https://doi.org/10.1007/s10648-010-9128-5>
48. Sweller, J. (2025). An integrated human cognitive architecture. *Educational Psychology Review*, 37. <https://doi.org/10.1007/s10648-025-10089-1>
49. Sweller, J., van Merriënboer, J. J. G., & Paas, F. (2019). Cognitive Architecture and Instructional Design: 20 Years Later. *Educational Psychology Review*, 31(2), 261-292. <https://doi.org/10.1007/s10648-019-09465-5>
50. Van de Pol, J., Volman, M., & Beishuizen, J. (2010). Scaffolding in Teacher-Student Interaction: A Decade of Research. *Educational Psychology Review*, 22(3), 271-296. <https://doi.org/10.1007/s10648-010-9127-6>
51. Vanderlinde, R., & van Braak, J. (2010). The gap between educational research and practice: Views of teachers, school leaders, intermediaries and researchers. *British Educational Research Journal*, 36(2), 299-316. <https://doi.org/10.1080/01411920902919257>
52. Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.
53. Wood, D., Bruner, J. S., & Ross, G. (1976). The role of tutoring in problem solving. *Journal of Child Psychology and Psychiatry*, 17(2), 89-100. <https://doi.org/10.1111/j.1469-7610.1976.tb00381.x>
54. Zeichner, K. M. (2003). Teacher research as professional development for P-12 educators in the USA. *Educational Action Research*, 11(2), 301-326. <https://doi.org/10.1080/09650790300200211>
55. Zhou, N., Liu, X., Jin, X., Li, T., Wang, C., & Admiraal, W. (2024). Motivation for and challenges in teacher research in underdeveloped areas of northwest China: An exploratory study. *Behavioral Sciences*, 14(11), Article 1064. <https://doi.org/10.3390/bs14111064>