3-HOUR HANDS-ON WORKSHOP

Improving Research Skills with Artificial Intelligence

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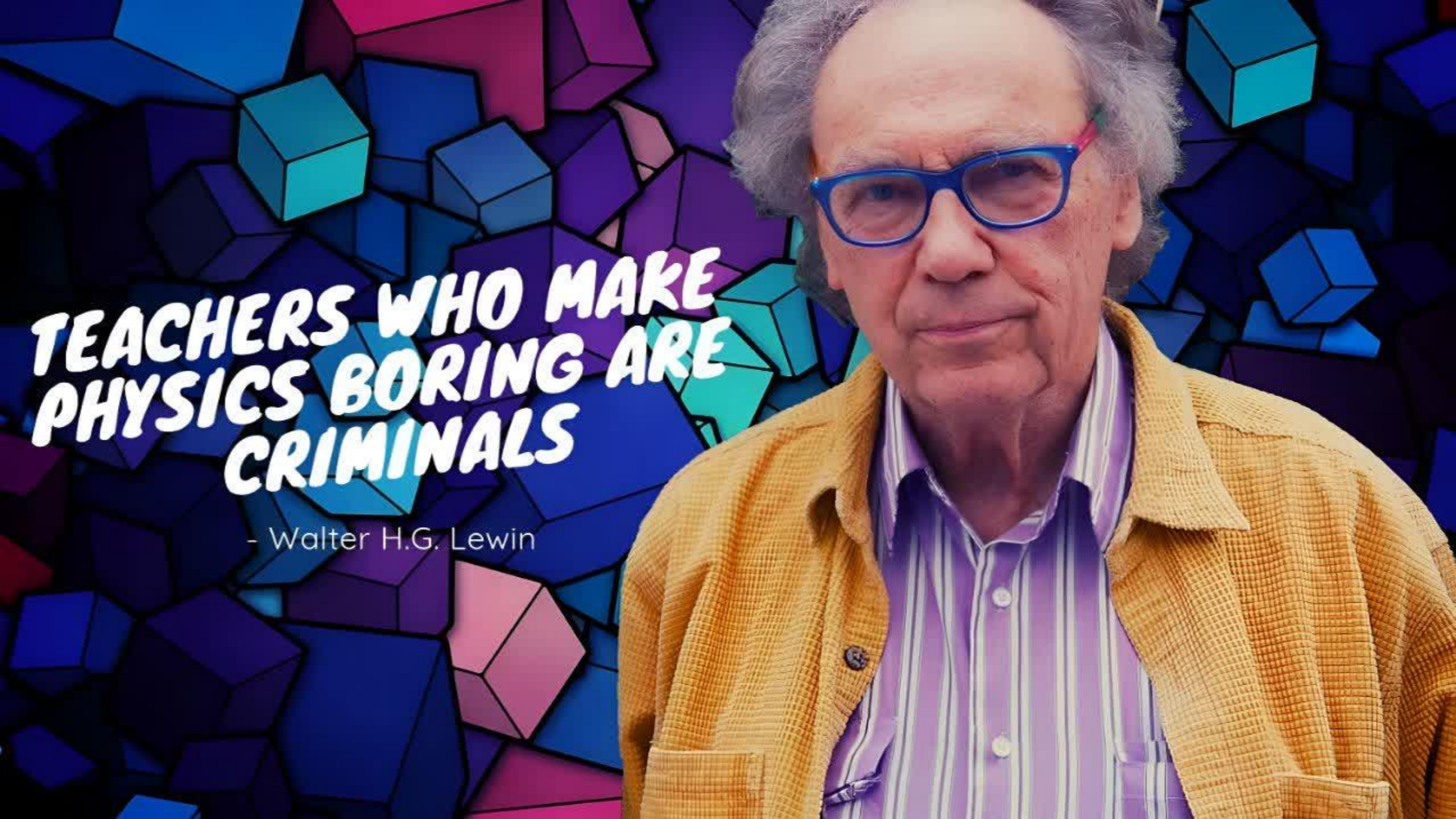
From evidence search to ethical writing, citation intelligence, and data extraction


TEACHERS WHO MAKE PHYSICS BORING ARE CRIMINALS
- Walter H.G. Lewin

Workshop Roadmap

1 **Academic Search**

Find credible evidence

2 **AI Writer**

Draft and improve academic text

3 **Chat Content**

Analyze text, image, PDF, voice, video

4 **Literature Review**

Synthesize prior studies

5 **Find Topics**

Convert interest into researchable questions

6 **Paraphraser**

Rewrite ethically and clearly

7 **Citation Data**

Interpret scholarly influence

8 **AI Detector**

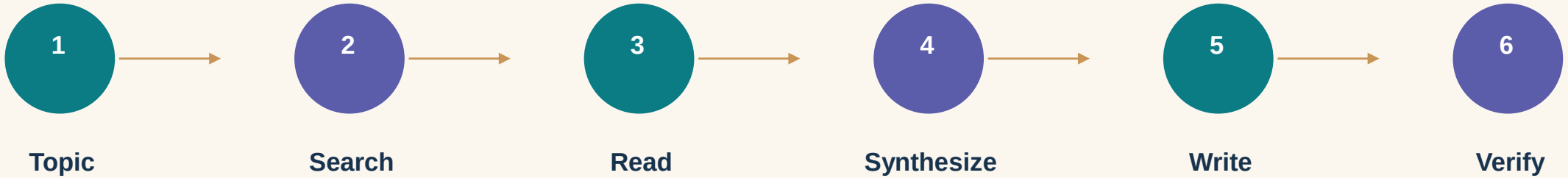
Understand detection limits

9 **Extract Data**

Build structured evidence tables

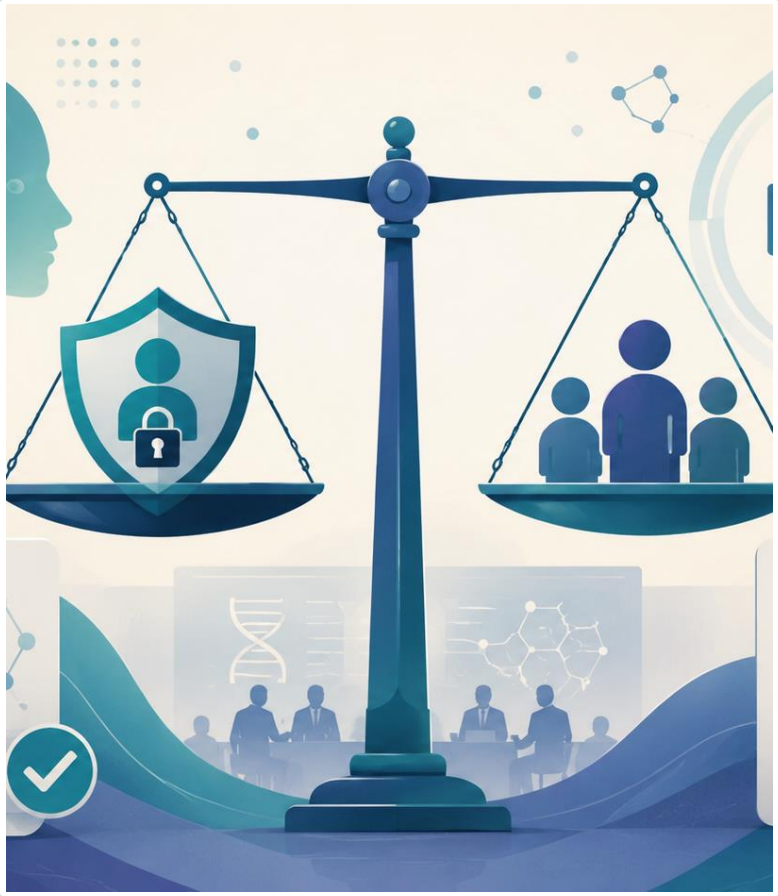
The emphasis is practical: live tool use, prompt design, output evaluation, and research ethics.

The AI-Assisted Research Workflow



A strong research prompt = role + clinical/academic context + task + output format + quality criteria

Ethical Use of AI in Medical Research



Visual cue for live explanation

In medical research, AI output is not just a writing issue; it affects validity, confidentiality, evidence quality, and professional responsibility.

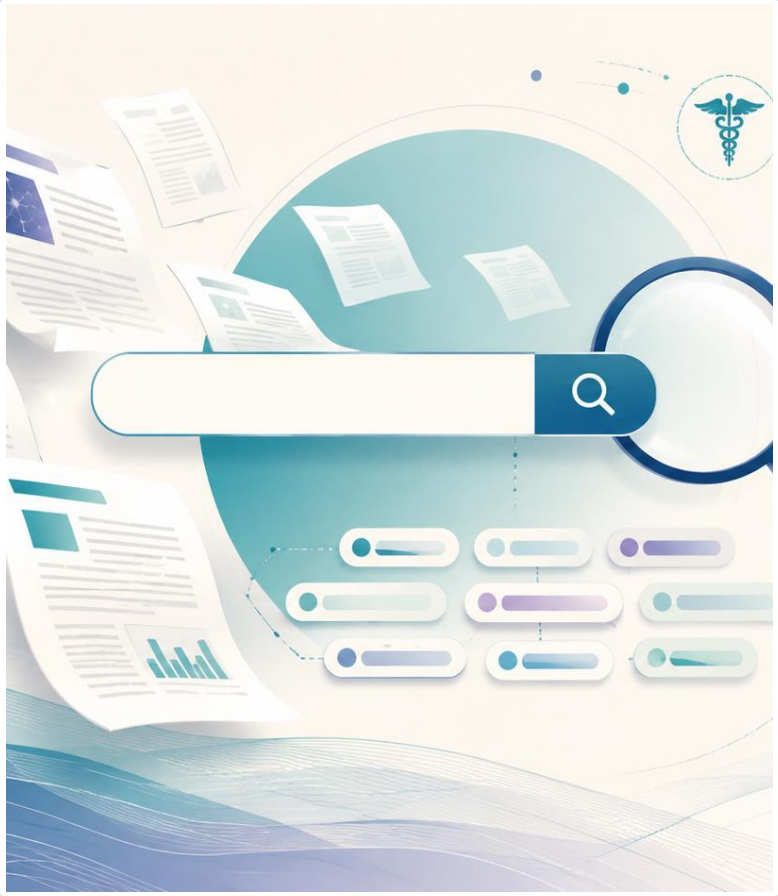
- Use AI as a research assistant, not as the final author or scientific judge.
- Do not enter patient-identifiable, confidential, or institutional data into public tools.
- Verify sources, statistics, clinical claims, and citations in trusted databases.
- Align AI use with university, journal, ethics committee, and institutional policies.

SECTION 05

Academic Search

Finding credible evidence before writing anything

Academic Search



Visual cue for live explanation

Academic search is the disciplined process of locating credible, relevant, and defensible evidence for a medical research question.

✓

- Start from a focused question, not from a vague topic.
- Use both natural-language keywords and controlled vocabulary such as MeSH terms.
- Combine concepts with AND, OR, NOT, filters, date limits, and study-type filters.
- Prioritize systematic reviews, clinical trials, guidelines, and high-quality original studies when appropriate.

Academic Search

DEMO PROMPT

LIVE DEMO SCENARIO

Research theme: artificial intelligence for early detection of breast cancer

Generate English search terms, MeSH-like terms, synonyms, and Boolean search strings for a study on “AI for early detection of breast cancer.” Organize the output into: core concepts, alternative terms, suggested search strings, and exclusion terms.

Expected output

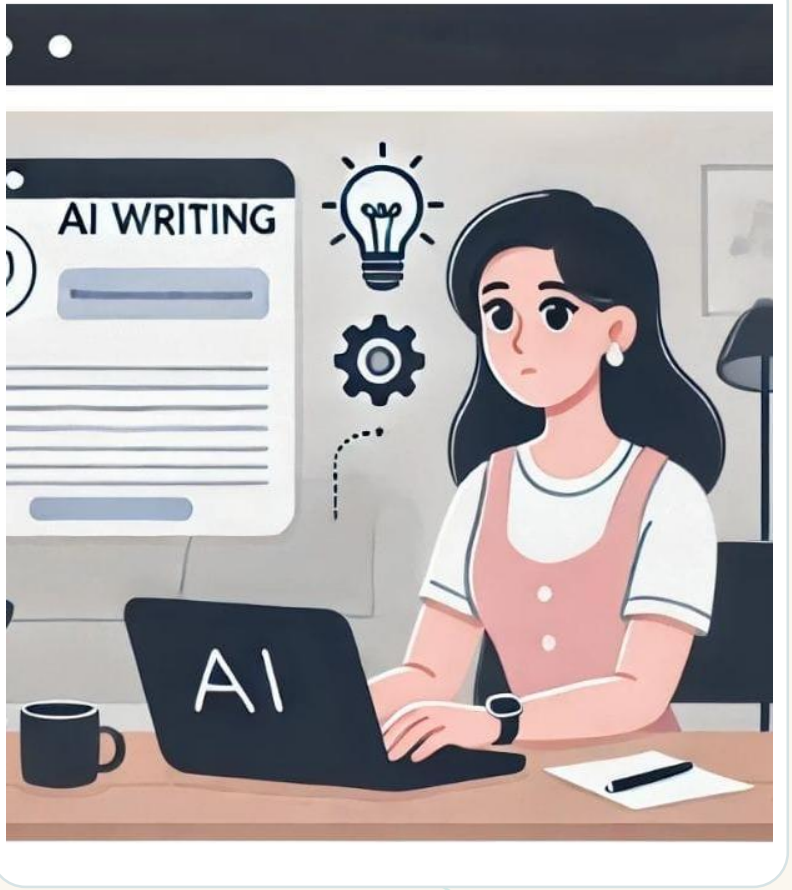
- Core concepts
- Boolean strings
- Terms to exclude

SECTION 08

AI Writer

Turning rough ideas into clear academic writing

AI Writer



Visual cue for live explanation

AI Writer tools help researchers draft, organize, revise, and polish academic text without replacing scientific judgment.

- Transform rough notes into a structured paragraph.
- Improve clarity, flow, and academic tone.
- Suggest outlines for introduction, methods, discussion, or abstract.
- Identify claims that require citation or stronger evidence.

AI Writer

DEMO PROMPT

LIVE DEMO SCENARIO

Scenario: developing a problem statement for a medical education study

Write a concise academic problem statement in Persian for a study on “the association between sedentary lifestyle and risk of type 2 diabetes among medical students.” Include the public health importance, target population, research gap, and study rationale. Avoid unsupported claims.

Expected output

- Problem statement
- Research gap
- Cautious claims

AI Writer

The professional boundary is simple: AI may improve expression, but the researcher must own the science.

- AI may fabricate references, numbers, or clinical claims.
- The text may become generic, repetitive, or overly polished.
- Never paste AI output into a thesis or paper without scientific review.
- When required, disclose how AI supported writing or editing.

SECTION 12

Chat Content

Text, image, PDF, voice, and video as research material

Chat Content (Text, Image, PDF, Voice or Video)

Visual cue for live explanation

Chat Content means asking AI to help understand, summarize, question, and extract information from research and educational materials.

✓

- Text: articles, books, reports, clinical guidelines, protocols.
- Image: charts, tables, infographics, educational images.
- PDF: papers, theses, technical reports, guideline documents.
- Voice/Video: interviews, lectures, webinars, conference presentations.

Chat Content (Text, Image, PDF, Voice or Video)

LIVE DEMO SCENARIO

Scenario: a medical paper on AI-assisted diagnosis of cardiovascular disease is uploaded to a chat-with-PDF tool.

Extract the main objective, study design, population, methods, key findings, limitations, and possible relevance to my research. Present the answer in a structured table and mention the approximate section of the paper where each item appears.

Expected output

- Objective
- Methods and population
- Findings and limitations

Chat Content (Text, Image, PDF, Voice or Video)

For each content type, the prompt should specify the task, the level of detail, and the output format.

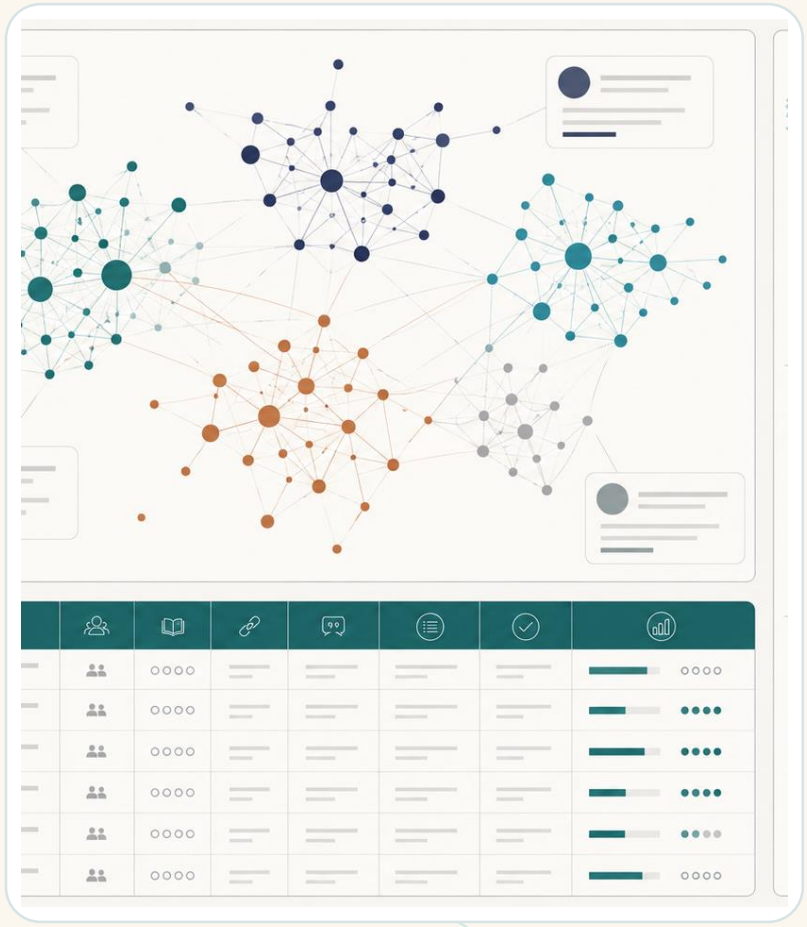
- Chart/image: explain the main trend, key comparisons, and research implications.
- Interview audio: summarize recurring themes and suggest initial qualitative codes.
- Educational video: extract learning points, teaching messages, and possible research questions.
- Article text: identify main claims, missing evidence, and unclear statements.

SECTION 16

Literature Review

From isolated papers to a defensible evidence map

Literature Review



Visual cue for live explanation

A literature review is not a list of article summaries; it is an analytical synthesis of what is known, debated, and missing.

- Identify major themes, theories, methods, and populations.
- Compare findings across studies instead of describing papers one by one.
- Explain contradictions, limitations, and unanswered questions.
- Connect the evidence gap to the purpose of your own study.

Literature Review

DEMO PROMPT

LIVE DEMO SCENARIO

Topic: AI-based training and clinical skills among medical students

For a literature review on “the effect of AI-based education on clinical skills among medical students,” organize the evidence into major thematic categories. For each category, summarize repeated findings, methodological limitations, contradictions, and possible research gaps.

Expected output

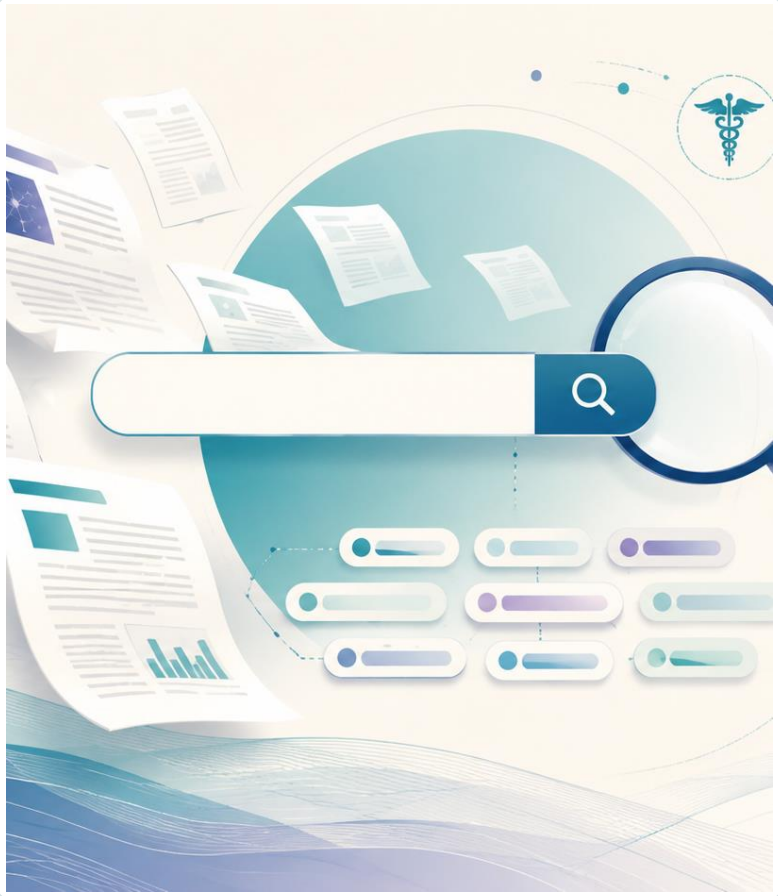
- Thematic categories
- Repeated findings
- Research gaps

SECTION 19

Find Topics

Designing focused, feasible, and ethical research questions

Find Topics



Visual cue for live explanation

Find Topics is the process of converting a broad interest into a focused, feasible, and publishable research direction.

✓

- A strong topic is specific, answerable, feasible, and meaningful.
- It should respond to a real health, education, or service need.
- It must match available time, sample access, measurement tools, and expertise.
- In medical research, ethical approval and confidentiality should be considered from the beginning.

Find Topics

DEMO PROMPT

LIVE DEMO SCENARIO

Field of interest: digital health and medical education

I am a medical student interested in digital health and medical education. Suggest 10 feasible research topics. For each topic, provide a title, research question, target population, suggested study design, data collection tool, significance, and possible ethical considerations.

Expected output

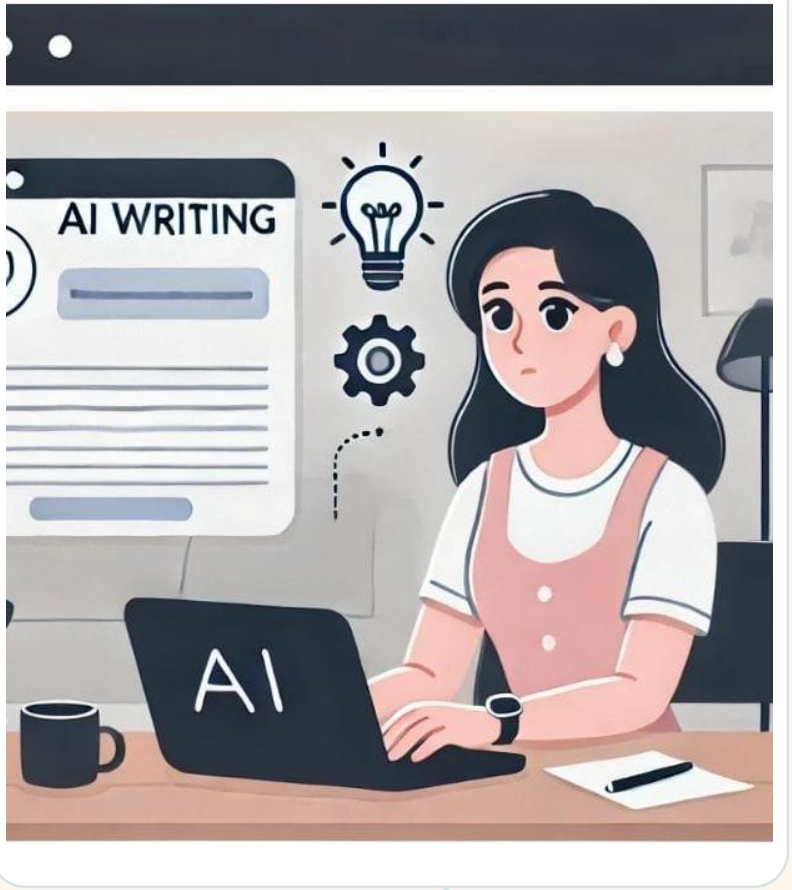
- Title
- Design
- Ethical considerations

SECTION 22

Paraphraser

Clearer wording without losing integrity

Paraphraser



Visual cue for live explanation

Paraphrasing means expressing the same idea in clearer language while preserving meaning and giving proper credit.

✓

- Paraphrasing is not replacing a few words with synonyms.
- The scientific meaning must not be distorted.
- The original source still needs citation.
- Good paraphrasing combines understanding, synthesis, and academic voice.

Paraphraser

DEMO PROMPT

LIVE DEMO SCENARIO

Scenario: revising a paragraph from the introduction of a medical paper

Rewrite the following paragraph in clear academic Persian. Preserve the original meaning, do not add new claims, improve sentence flow, and remind me that the original source should still be cited. Make the style appropriate for a medical research article.

Expected output

- Preserved meaning
- Academic tone
- Citation reminder

Paraphraser

Safe use

- Clarifies complex sentences
- Improves flow and tone
- Keeps the original meaning
- Maintains citation responsibility

Unsafe use

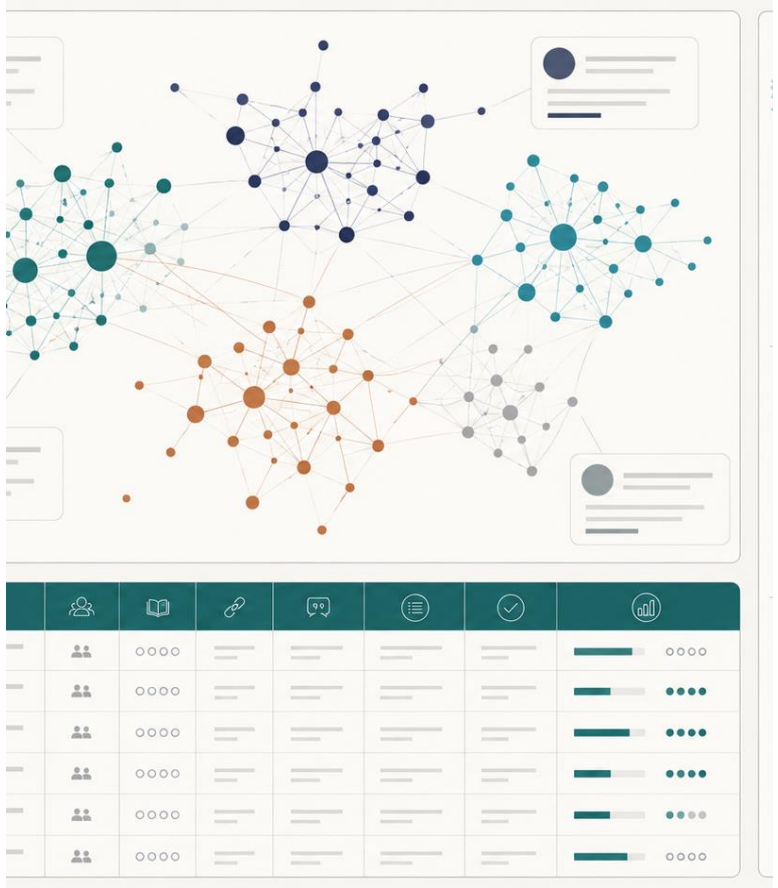
- Hides plagiarism
- Changes scientific meaning
- Adds unsupported claims
- Removes or ignores sources

SECTION 26

Citation Data

Reading scholarly influence with caution

Citation Data



Visual cue for live explanation

Citation data reveal how articles, authors, journals, and research areas are connected—but they do not automatically prove quality.

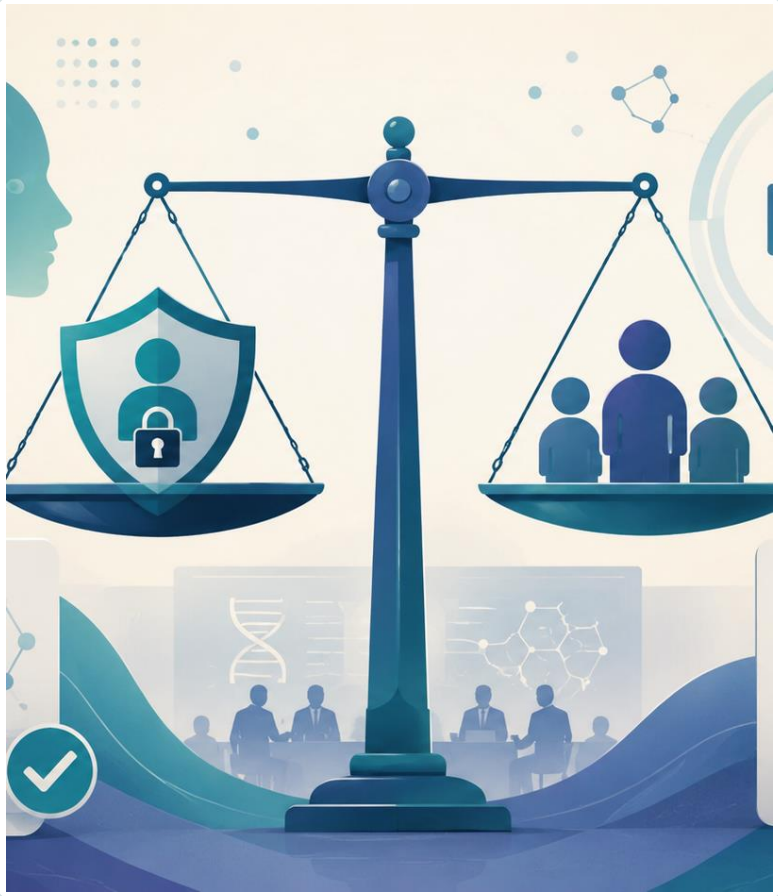
- Find influential papers and foundational references.
- Identify key authors, groups, and journals in a field.
- Trace who cited a paper and what sources the paper relied on.
- Interpret citation counts in context: field, age of paper, self-citation, and relevance.

SECTION 28

AI Detector

Understanding detection tools without overtrusting them

AI Detector



Visual cue for live explanation

AI detectors try to estimate whether text was AI-generated, but their results are not definitive evidence.

- They may flag human-written text as AI-generated.
- They may fail to detect carefully edited AI-generated text.
- Short, formulaic, or non-native writing may be misclassified.
- Scientific quality, sources, methods, and argumentation matter more than a percentage score.

AI Detector

✓

Appropriate

- Initial writing review
- Find generic sections
- Support style revision

!

Use with caution

- False positives occur
- False negatives occur
- Human judgment is required

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Inappropriate

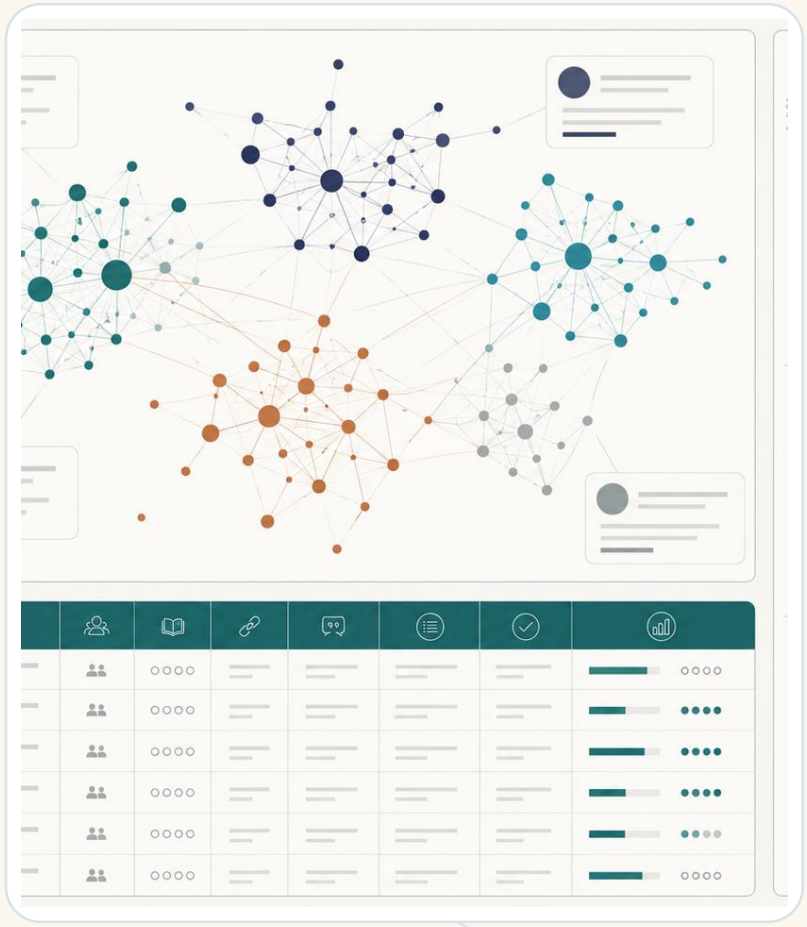
- Final accusation
- Ignoring evidence quality
- Punitive use without review

SECTION 31

Extract Data

Turning papers into structured evidence tables

Extract Data



Visual cue for live explanation

Extract Data means pulling important, comparable information from papers, tables, figures, and reports into a structured format.

✓

- Useful for systematic reviews, meta-analyses, narrative reviews, and thesis literature tables.
- AI can accelerate extraction, but every cell must be checked against the original paper.
- Missing information should be labeled clearly rather than guessed.
- The extraction table should match the purpose of the review.

Extract Data

DEMO PROMPT

LIVE DEMO SCENARIO

Scenario: building a data extraction table from medical articles

Create a data extraction table from the article. Use columns for title, year, country, study design, population, sample size, method, data collection tool, main findings, limitations, and recommendations for future research. If information is not available, write “Not reported.”

Expected output

- Structured table
- Missing data labeled
- Ready for verification

Extract Data

For medical studies, extraction should make comparison across studies possible.

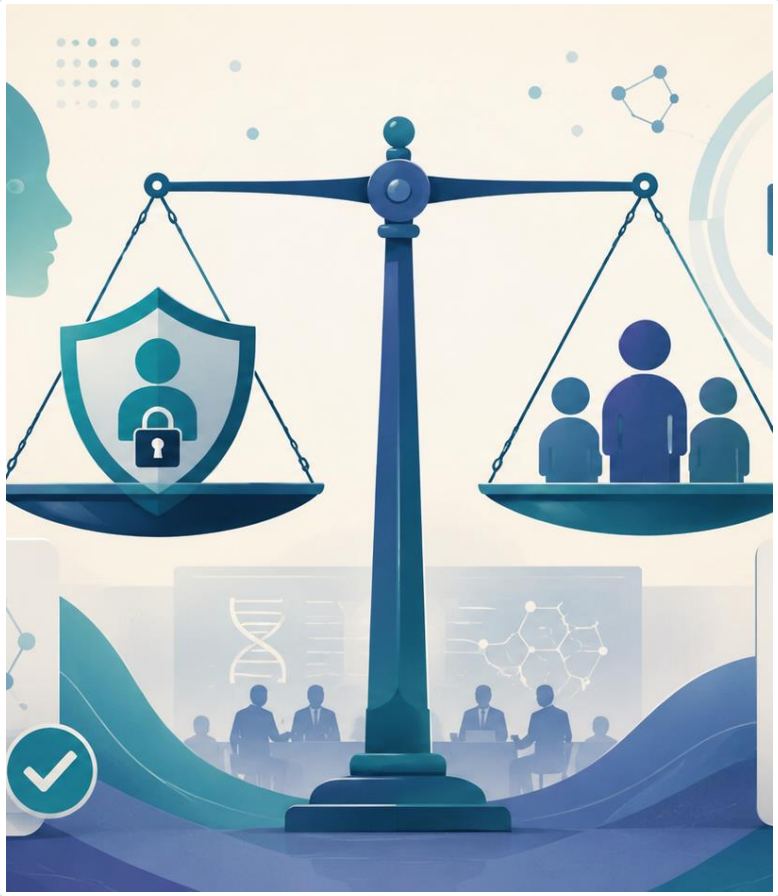
- Bibliographic details: title, authors, year, country, journal.
- Design details: study type, population, sample size, inclusion/exclusion criteria.
- Measurement details: tools, variables, outcomes, and analysis methods.
- Interpretive details: key findings, limitations, ethical issues, and relevance to your study.

Putting It All Together

Tool function	Research question	Output to request	Human verification
Academic Search	What is already known?	Search terms + key papers	Databases, journal, relevance
Chat Content	What does this paper say?	PICO, method, findings	Compare with the original PDF
Literature Review	What is the gap?	Themes + matrix	Quality of evidence
Extract Data	What can be compared?	Structured extraction table	Check every cell

Use AI to accelerate the workflow; use your expertise to protect validity, ethics, and interpretation.

Before Trusting AI Output



Visual cue for live explanation

Before using AI output in a proposal, thesis, paper, or presentation, apply a disciplined verification checklist.

- Does the output answer the exact research question?
- Are all references real, relevant, and correctly represented?
- Are clinical claims supported by reliable evidence?
- Was any sensitive or confidential data exposed?
- Can I defend the methods, reasoning, and interpretation myself?

Key Takeaways

Visual cue for live explanation

In this workshop, AI is positioned as a practical assistant for faster, clearer, and more responsible medical research.

✓

- Search smarter: build better terms and evaluate evidence quality.
- Read faster: use chat tools to understand papers and multimedia content.
- Write better: draft, revise, paraphrase, and cite responsibly.
- Think deeper: synthesize literature, choose feasible topics, and extract data carefully.
- Stay accountable: verify everything and protect ethics at every step.

Better evidence.
Sharper writing.
More responsible research.

AI is powerful when the researcher remains critical, ethical, and accountable

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