The Research Help Book

New User

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Chapter 1

Research prompts

I am a beginner trying to read research papers with the aim of identifying research gaps so I can publish my own papers.

However, I have no prior experience with research or reading academic papers, and I find it quite challenging due to several issues.
These include difficult English, complex paper structures, poorly explained content, and limited background knowledge on the topics discussed.

Currently, I have decided to focus my research on AI/ML, specifically the use of large language models (LLMs) in education.

I would like to discuss how you can assist me in understanding research papers.
It would be helpful if you could provide me with a list of clear, well-structured prompts that I can use to gradually build my comprehension—from the basics to a thorough understanding of any research paper.

1.1 Prompts

1. Act as my research mentor. For each part or section, explain key ideas and ask me reflective questions so I can build understanding.
2. Give a list of tools/technologies/methods/methodologies they used in this paper
3. What is the the initial input and final output of the work propesed by this paper.
4. What the stages which converts input(example a prompt) to final output(example mcq questions)
5. Create a diagram/table/flowchart showing how all these components interact in the MCQGen pipeline?
6. Convert this into a visual diagram (flowchart-style image) showing arrows and boxes
7. Give a step-by-step narrative explanation of each stage (like how data flows and decisions happen)?
8. What new thing the paper as done or proposed and what was the earlier approach
9. Summarize this paper simply for a beginner
10. Explain what each section of this paper contributes
11. Explain the technical terms and equations simply.
12. Explain how their experiment works and what they found
13. Evaluate the paper's methodology and reliability
14. List research gaps or open problems from this paper
15. Suggest related works or follow-up papers
16. Based on these gaps, suggest possible research ideas for me

Prompt Categories for Understanding Research Papers

A. Quick / Beginner Prompts

- Give a TL;DR of this paper (one sentence)
- Give a 2-sentence explanation aimed at a high-school student
- Summarize this paper for a beginner in 5 bullet points: problem, why it matters, what they did, how they evaluated it, main result
- Translate the abstract into plain English. Replace technical words with everyday words.
- List 10 glossary terms from this paper and define each in one sentence.
- Translate the abstract into plain English. Replace technical words with everyday words
- Explain what each section of this paper contributes
- Explain the technical terms and equations simply.
- Explain how their experiment works and what they found
- Evaluate the paper's methodology and reliability
- What new thing the paper as done or proposed and what was the earlier approach

B. Structure / Components Prompts/ Process & Dataflow Prompts

- List all tools / technologies / methods / methodologies used in this paper (e.g., models,libraries, datasets, metrics)
- What is the the initial input and final output of the work propesed by this paper
- What the pipeline stages which converts input(example a prompt) to final output(example mcq questions)
- Create a short checklist of what I'd need to implement a minimal working version (code libraries, hardware, dataset, hyperparameters).
- Explain step-by-step how input data is transformed into the output — write it as a numbered sequence.
- Make a table: left column = stage name, middle = what happens there, right = inputs/outputs of that stage.

C. Visuals & Diagrams Prompts

- Create a concise flowchart description (text) I can use to draw a diagram: nodes and arrows labeled.
- Create a diagram/table/flowchart showing how all these components interact?
- Convert this into a visual diagram (flowchart-style image) showing arrows and boxes
- Give a step-by-step narrative explanation of each stage (like how data flows and decisions happen)?
- Convert the pipeline into pseudocode (short, main functions only).

- Generate a flowchart description (boxes + arrows) for the model pipeline suitable for slide creation.
- Create a simple diagram caption and a short legend for each box in the flowchart.
- List the exact labels and a recommended layout (horizontal/vertical) to draw the diagram in PowerPoint.

D. Math, Algorithms, and Code Prompts

- Explain the main equations line-by-line. For each variable, say what it represents and its units if any.
- Show a worked toy example (numerical) through the core equation / algorithm (use small numbers).
- Translate the method into Python-like pseudocode, with function names and comments.
- If I wanted a minimal reproducible code snippet, what are the 8–12 lines of code I could start with?
- Identify hyperparameters, their roles, and good starting values (with justification).

E. Evaluation, Baselines, and Experiments Prompts

- List the datasets used, their sizes, and why they are appropriate or not.
- Summarize the evaluation metrics and explain what each one means in practice.
- Compare the paper's method with the baselines: what improves and by how much (numbers)?
- Suggest 3 ablation experiments to test which parts of the model matter most.

F. Critique & Limitations Prompts

- List 8 strengths and 8 weaknesses of the paper — be concrete and specific.
- Identify any unstated or hidden assumptions the authors make.
- Find possible failure modes or data regimes where their approach will break.
- Point out questionable experimental choices or missing baselines.

G. Research Gap / Idea Generation Prompts

- Based on this paper, suggest 6 follow-up research questions or directions.
- Propose 4 concrete, publishable project ideas that extend or improve this paper (include a one-sentence hypothesis and one experiment each).
- Find low-effort / high-impact experiments I could run in 1–2 weeks to get publishable results.
- Suggest related fields or communities (conferences/journals) that would be interested in this work.
- List research gaps or open problems from this paper

- Suggest related works or follow-up papers
- Based on these gaps, suggest possible research ideas for me

H. Reproducibility & Implementation Prompts

- Give me a step-by-step reproducibility checklist: data download → preprocessing commands → training command → evaluation command.
- List exact hardware and runtime estimates (GPU type, memory, time) for training the model at published scale (rough estimate).
- Create a minimal dataset / toy dataset and the code to test the idea quickly.

I. Writing, Presentation & Literature Mapping Prompts

- Write a concise Related Work paragraph that places this paper among similar efforts (3–4 sentences).
- Draft a paragraph that summarizes this paper to include in my literature review.
- Create 6 slide titles and one-line bullet points for a 6-slide presentation of this paper.
- Find 8 papers cited by this paper and give a 1-sentence summary for each (if you can access them).

J. LLM-in-Education Specialization Prompts

- Explain how this paper's method could be adapted for educational use-cases (MCQ generation, feedback, tutoring).
- Give 6 concrete ways a large language model could be integrated into this pipeline for education-specific improvements.
- List ethical / fairness / safety issues when using LLMs in education and how to test for them.

K. Practical Usage Prompts

- I am uploading [paper.pdf]. Start by giving me: 1) TL;DR (1 sentence), 2) Beginner summary (3 bullets), 3) Top 5 weaknesses.
- Here is the PDF. Produce a slide deck outline (6 slides) and a diagram description of the pipeline.
- Take this paper and suggest 3 reproducible experiments I can run in 2 weeks on a single GPU; include datasets and approximate time.

1.2 Goal

1. Learn how to read and understand research papers
2. Extract the key ideas and identify research gaps

3. Gradually build enough knowledge to design and publish your own paper in AI + Education (LLMs)

4. LLm can generate

   (a) Plain-English summary (for beginner comprehension)

   (b) Concept map (explaining how ideas are related)

   (c) Methodology flow explanation

   (d) Glossary of technical terms

   (e) Critical evaluation (strengths, limitations, assumptions)

   (f) Research gaps + possible extensions

   (g) Template for your literature review