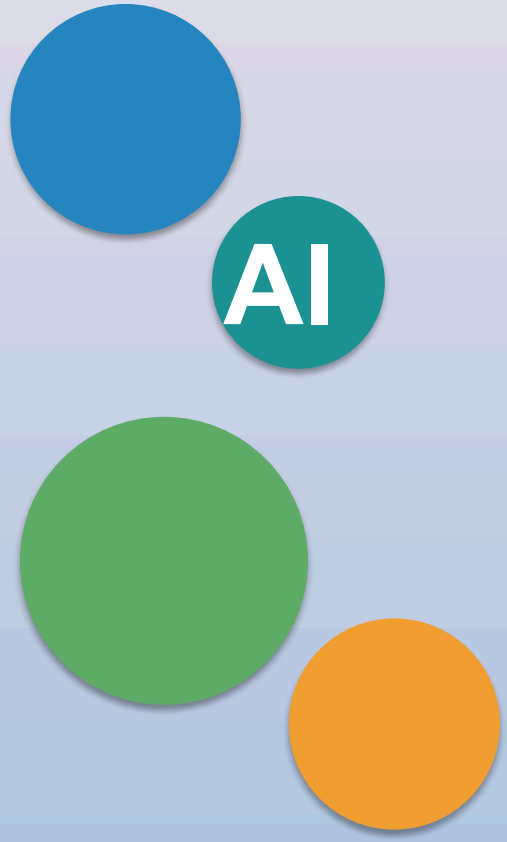
Critical AI Literacy

and Cognitive Biases
in Academic Research



2237-A Bilimsel Eğitim Etkinlikleri Destek Programı

İngiliz Dili Eğitimi ve İngiliz Dil bilimi Bölümleri Lisansüstü
Öğrencilerine Yönelik Yapay Zekânın Akademik Araştırmalarda
Kullanımı Kursu

Doç. Dr. Fatma ARSLAN
Kahramanmaraş Sütçü İmam Üniversitesi

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When was the last time you used an AI tool for academic work?

- Writing/editing
- Literature search
- Summarizing articles
- Generating research ideas
- Translation
- Data analysis
- Teaching/material preparation

AI

↔

Researcher

Your experience is part of the discussion.

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Where Can Researchers Use AI?



Research idea

- research questions
- possible topics
- research gaps

Research design

- methodology brainstorming
- interview questions
- survey items

Writing

- language editing
- organization
- paraphrasing
- coherence

Literature

- search strategies
- summarization
- comparison
- concept mapping

Data

- coding assistance
- categorization
- transcription
- qualitative analysis support

Revision

- reviewer-style feedback
- clarity
- argumentation

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If an AI tool gives you a convincing answer, how much do you trust it?

?



Write your answer in the chatbox.

Not at all

Very much

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A Convincing Answer: What Is Wrong With It?

Prompt

“Does ChatGPT improve academic writing among EFL graduate students?”

AI response

“Recent research has demonstrated that ChatGPT significantly improves academic writing among EFL graduate students by increasing grammatical accuracy, vocabulary diversity, coherence, and overall writing quality.”

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A Convincing Answer: What Is Wrong With It?

Prompt

“Does ChatGPT improve academic writing among EFL graduate students?”

AI response

“Recent research has demonstrated that ChatGPT significantly improves academic writing among EFL graduate students by increasing grammatical accuracy, vocabulary diversity, coherence, and overall writing quality.”

Red flags

- “Recent research” is vague.
- No citations.
- “Demonstrated” is too strong.
- “Significantly” implies statistical evidence.
- “Improves” implies causality.
- Which EFL students? Which studies?
- What does “overall writing quality” mean?
- Could findings be mixed?
- Is this based on empirical evidence?

The problem is not necessarily that every sentence is false. The answer sounds more certain than the evidence may justify.

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A Convincing Answer: What Is Wrong With It?

Prompt

“Do advanced EFL learners underuse linking adverbials in research articles?'

AI response

«Recent corpus studies consistently demonstrate that advanced EFL learners underuse conjuncts by exactly 40% compared to native speakers across all academic genres, leading to lower textual cohesion»

Red flags

• by exactly 40%' is far too specific and treats language acquisition as a universal monolith.

• Recent studies - No citations.

• all academic genres – too strong , register variation is completely ignored.

The problem is not necessarily that every sentence is false. The answer sounds more certain than the evidence may justify.

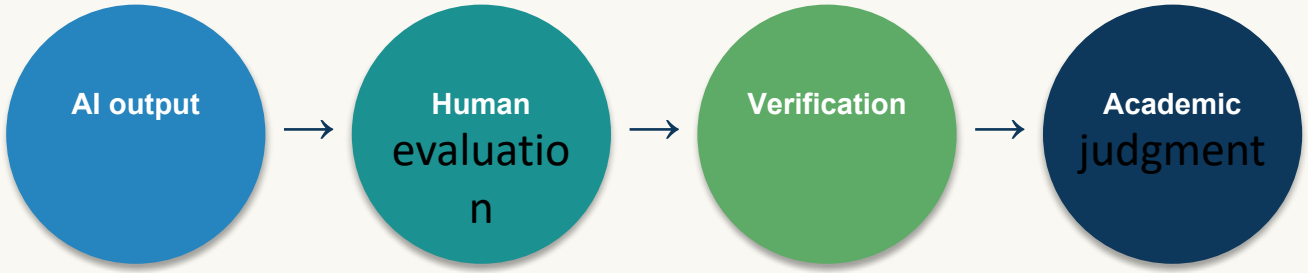
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Why Do We Need Critical AI Literacy?

AI-generated outputs can appear:

- confident
- fluent
- objective
- personalized
- authoritative

Fluency does not guarantee accuracy.



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What Is Critical AI Literacy?

Critical AI literacy is the ability to understand, apply, and assess AI operations, uses, and outputs.

(Pérez-Paredes et al., 2025)



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The Three Levels of Critical AI Literacy

LEVEL 1
USE

Can I use
the tool?

↓

LEVEL 2
EVALUATE

Can I evaluate
what it produces?

↓

LEVEL 3
DECIDE

Can I decide when, why,
and whether I should use it?

↓

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Human-Centred AI Use

AI is a tool that serves human purposes and values, not an autonomous authority.

Researchers remain responsible for defining research questions, evaluating evidence, making methodological decisions, interpreting findings, and taking responsibility for the final work.

AI can produce biased, inaccurate, incomplete, or misleading outputs.

Critical evaluation against reliable evidence and disciplinary knowledge is essential.

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Human-Centred Principles

Human agency	The researcher makes the final decisions.
Human oversight	AI-generated outputs are checked rather than automatically accepted.
Critical evaluation	Researchers question AI outputs, sources, assumptions, and possible biases.
Transparency	Researchers disclose AI use when appropriate and required.
Responsibility	The researcher—not the AI system—is accountable for the final academic work.

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Common Cognitive Biases

Automation bias	Accepting an AI answer because the system produced it
Confirmation bias	Accepting AI evidence that supports what we already believe
Anchoring	Becoming attached to the first research question or interpretation suggested by AI
Authority / fluency effect	Treating a fluent, academic-sounding response as more credible than it may be

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Researcher-Related Problems

1

Confirmation bias

We notice information that supports what we already believe.

“I believe ChatGPT improves academic writing.”

2

Automation bias

We may accept AI outputs too quickly.

“The AI gave me five references, so they must be real.”

3

Anchoring

The first answer influences subsequent judgment.

AI’s initial explanation can shape later interpretation.

4

Authority / fluency effect

Professional, confident language can feel more credible than it is.

Fluent language ≠ verified evidence.

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AI-Related Problems & the Human-in-the-Loop Researcher

Training data → model → output

- representation bias
- linguistic / cultural bias
- stereotypical associations
- missing perspectives
- hallucinations / confabulations

"Recent research shows that AI feedback significantly improves academic writing among EFL students."

What should the researcher do?

- A. Accept because it sounds academic.
- B. Ask AI to explain it further.
- C. Search for and verify the original studies.
- D. Check whether the claim applies to the particular population/context.

AI bias + human bias → amplified research error

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STOP–CHECK–DECIDE: Questions Before You Trust AI



SOURCE

Where did this information come from?



TRUTH / EVIDENCE

What evidence supports the claim?



OTHER SOURCES

Can I verify it elsewhere?



PURPOSE

What am I using the output for?

STOP before you submit.

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STOP–CHECK–DECIDE: Questions Before You Trust AI



SOURCE	TRUTH / EVIDENCE	OTHER SOURCES	PURPOSE
Where did this information come from?	What evidence supports the claim?	Can I verify it elsewhere?	What am I using the output for?

Linguistics is the scientific study of language, encompassing the systematic analysis of its structure, meaning, and social use. Scholars in this field examine various dimensions of human communication, ranging from phonetics and syntax to pragmatics and discourse analysis. By applying qualitative, quantitative, and corpus-based methodologies, linguists investigate how language functions across different cultural contexts, educational settings, and multimodal texts.

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If an AI tool gives you a convincing answer, how much do you trust it?

?



Do you still have the same answer?

Not at all

Very much

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Key Takeaways

- AI is a powerful tool, not a replacement for human judgment.
- Critical AI literacy helps us use AI responsibly and effectively.
- Be aware of AI-generated and human cognitive biases.
- Always verify, question, and evaluate AI outputs.
- Use the STOP–CHECK–DECIDE procedure.
- Keep the researcher at the centre.

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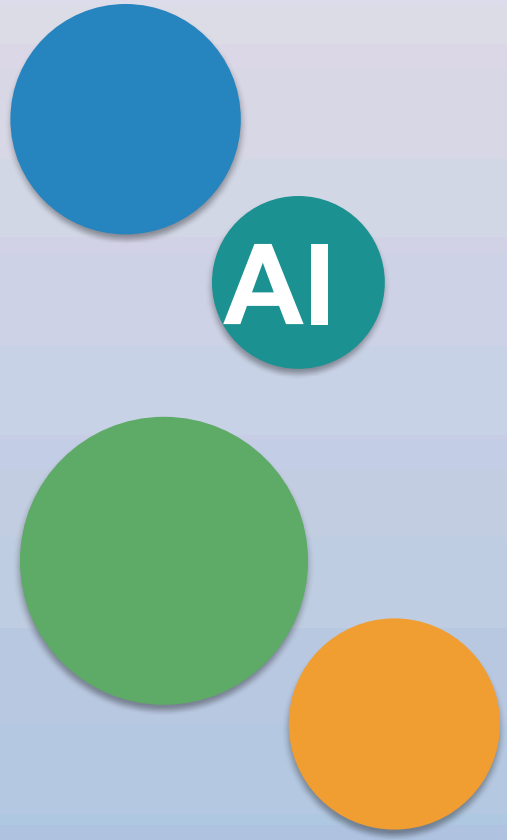
Key Takeaways

AI should serve human purposes, values, and decision-making—not replace human agency.

AI can assist academic thinking,
but it should not replace academic judgment.

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ARTIFICIAL INTELLIGENCE AND ACADEMIC RESEARCH From Fundamentals to Practice: Concepts, Tools, Ethics, and Application



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PRESENTATION OUTLINE

What Will We Cover in Four Hours?

01 Fundamental Concepts: AI, ML, DL, LLM, NLP — step by step from scratch

02 Use Cases in Academia: Role by role, tool by tool — the most comprehensive section

03 Ethical Use: Good/bad examples and two real-world case studies

04 Prompt Engineering: Seven principles, step-by-step with examples

05 Academic Integrity and Declaration: Policies of five major publishers

06 Roles, Paradigm, and Future: Researcher, educator, and beyond

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INTRODUCTION

This Is Not a Trend, But the Final Stage of a Long Process

With ChatGPT entering our daily lives in November 2022, AI rapidly spread into academic domains.

However, the origins of AI date back to the 1950s with Alan Turing's question: 'Can machines exhibit intelligent behavior?'

Having previously existed in healthcare via image processing technology, AI has now secured a permanent place in academia through natural language processing tools.

- 1950: Turing Test proposed
- November 2022: ChatGPT launched to the public
- March 2023: 'AI earthquake' — AI added as 3rd author in journals
- 2023–26: Publishers release formal AI policies
- 100–150: Estimated number of AI tools available today for academic production

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SECTION 1

Fundamental Concepts

AI, ML, DL, LLM, and NLP — explained step by step from scratch

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What is Artificial Intelligence (AI)?

The broadest umbrella concept defined as the ability of machines to perceive, synthesize, and infer information.

Utilizing these capabilities to perform tasks such as speech recognition, computer vision, and cross-lingual translation.

AI is not a single technology, but a set of goals: enabling machines to mimic human-like cognitive functions (learning, problem-solving, perception).

Roots date back to the 1950s, but most current applications became possible over the past decade, especially with the advancement of deep learning.

Machine learning and deep learning are different methods for achieving AI; AI is the goal, while ML and DL are the paths to reach it.

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What is Machine Learning (ML)?

The 'learning' subset of AI focused on understanding and developing methods that allow computers to 'learn' and improve computer performance on specific tasks using data.

In classical programming, humans write rules and computers apply them. In machine learning, we give data to the computer, and the computer extracts the rules itself.

ML algorithms are used in various applications such as speech recognition and text generation.

Example: An email program's spam filter works not through fixed pre-written rules, but by learning from millions of sample emails.

Machine learning is a large subset of AI, containing many sub-methods — deep learning is just one of them.

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What is Deep Learning (DL)?

The foundation of today's large language models, based on artificial neural networks.

Developed by drawing inspiration from information processing in biological systems and distributed communication nodes — the working logic of neurons in our brain (Connectionism in AI).

The word 'deep' comes from the network consisting of many layers — each layer learns different levels of abstract patterns in the data.

Breakthrough successes in complex tasks such as image recognition, speech recognition, and language generation stem from deep learning.

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Visualizing the Three Concepts Together

Think of them as three nested circles:

• AI (Outermost Circle): Artificial Intelligence — machines achieving human-like behavior. Encompasses all intelligent tasks like speech recognition, computer vision, and translation.

• ML (Middle Circle): Machine Learning — family of methods achieving AI goals by learning from data. Logic of extracting rules from data instead of writing rules.

• DL (Innermost Circle): Deep Learning — ML's most powerful and widespread subset based on artificial neural networks. The foundation of LLMs.

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What is a Large Language Model (LLM)?

LLM stands for Large Language Model: a large-scale language model pre-trained with billions of parameters and trained on vast datasets.

Can perform numerous natural language processing tasks with high accuracy, such as text generation, summarization, translation, and question-answering.

Easily adaptable to different sectors and use cases through fine-tuning or prompt engineering.

Tools like ChatGPT, Claude, and Gemini are all LLMs — different names, same underlying technology family.

The term 'parameter' refers to the number of internal variables adjusted during training; modern large models can have hundreds of billions of parameters.

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How Do LLMs Actually 'Think'?

Fundamentally, an LLM predicts which word (more accurately, which 'token') has the highest probability of coming next in the given text.

This prediction is based on statistical patterns in billions of sentences seen during training — the model does not 'understand', it recognizes patterns and generates the most likely next piece.

This mechanism explains why models can sometimes 'fabricate' (hallucinate) fluent but incorrect information: the model generates statistically consistent sequences, not objective truth.

Therefore, an LLM output must always be verified by human eyes — especially when academic sources, figures, or citations are involved.

This knowledge forms the basis of 'hallucination' and 'source verification' discussed in later sections.

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Popular LLMs: A Brief Introduction

1. ChatGPT (OpenAI): The most widely known and used LLM; based on GPT technology, with continuously updated versions (e.g., GPT-4o).

2. Claude (Anthropic): Known for processing long texts and security-focused design; frequently preferred for academic writing and analysis.

3. Gemini (Google): Integrated with Google search and products, possessing strong multimodal (text, image, audio) capabilities.

4. All three are 'general-purpose' LLMs — not trained specifically for a single academic task; tools like Scite AI or Julius AI specialize these general models for specific tasks.

5. Important fact: ~90-95% of tools on the market use OpenAI's GPT technology in the background — many different names are actually different interfaces for the same core engine.

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What is Natural Language Processing (NLP)?

An interdisciplinary subfield combining computer science and AI, concerning interactions between computers and human language.

Focuses on programming computers to process and analyze large amounts of natural language data.

NLP is much older than LLMs — spell checkers, machine translation systems, and voice assistants are all products of NLP.

Today's LLMs emerged as a result of combining NLP with deep learning — meaning an LLM is NLP's most advanced current application.

Without NLP, it would be impossible for an LLM to 'understand' your query and 'produce' a coherent response.

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What is Natural Language Generation (NLG)?

NLG can be compared to the human process of turning ideas into writing or speech.

Defined as a subfield of AI and computational linguistics where computer systems generate English or Turkish texts from a non-linguistic representation.

NLP has two major halves: Understanding (NLU — interpreting text) and Generation (NLG — creating new text).

When you ask an LLM a question, the 'understanding' side activates first (interpreting your query), followed by the 'generation' side (forming the response).

Understanding this distinction helps clarify why some tools focus solely on 'reading/analysis' (e.g., ChatPDF) while others focus on 'generation' (e.g., Scite AI paragraph writing).

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Technological Infrastructure: Do They All Use the Same Engine?

Analogy: General Practitioner vs. Domain Specialist.

Many AI tools (~90-95%) use OpenAI's GPT technology in the backend.

Tools like Scite AI, Julius AI, and Refy are specialized layers built on top of GPT tailored for specific academic tasks (literature review, data analysis, peer review).

AI detection software similarly operates on mathematical models like vector (numerical) probabilities of word co-occurrence.

Why is this important? When choosing a tool, ask 'How specialized is it for my academic task?' rather than just 'What core engine does it use?'

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SECTION 2

Use Cases in Academia

Role by role, tool by tool — the most comprehensive section

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Use Cases for Academics: Publishing Processes

1. Draft Generation: Rapidly producing initial draft paragraphs from a research question.
2. Literature Review & Synthesis: Summarizing key themes across numerous sources and interrelating them.
3. Bibliography Formatting: Formatting references according to APA, MLA, etc.
4. Academic Translation & Editing: Enhancing fluency and naturalness, especially for non-native English speakers.

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Use Cases for Academics: Submissions and Reviewing

1. Submission Draft Preparation: Quickly drafting application texts while strictly preserving content originality.
2. Statistical Analysis Interpretation: Explaining output tables in plain language.
3. Preparing Responses to Reviewers: Drafting response letters for editors and reviewers.
4. Pre-screening and Review Automation: Some tools pre-check manuscript compliance with journal formatting standards.

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Use Cases for Academics: Teaching Processes

1. Exam Question Generation: Creating test or essay questions suited to course content, even at varying Bloom's Taxonomy difficulty levels.

2. Course Material Generation: Drafting slide structures, examples, and explanatory content.

3. Grading Support: Providing preliminary feedback on open-ended answers — final grading always remains with the instructor.

4. Thesis Topic Suggestion: Generating creative and original topic titles based on student interests — subject to advisor approval.

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Use Cases for Students: Learning Support

1. Lecture Note Summarization: Extracting short, clear summaries from books, articles, or lecture slides.
2. Explaining Concepts: Having complex course topics re-explained in simple terms with examples.
3. Problem Solving & Step-by-Step Guidance: Requesting step-by-step logic explanations for difficult problems.
4. Tiered Concept Explanation: Explaining technical terms at elementary, high school, or university levels.

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Use Cases for Students: Writing & Presentations

1. Thesis & Project Idea Generation: Generating creative and original topics based on interests.
2. Academic Writing Support: Assisting with scientific text structure and section development.
3. Citation & Reference Checking: Verifying accuracy, format, and citation types of used sources.
4. Presentation Assistance & Translation: Slide structure suggestions, English/Turkish translation and simplification, similarity checking.

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Use Cases for Administrative Staff: Communication

1. Official Correspondence Drafting: Quickly preparing initial drafts complying with institutional style and format.
2. Summarizing Meeting Notes: Extracting key decisions and action items from long meeting recordings or texts.
3. Email Template Suggestions: Draft recommendations for recurring correspondence types.
4. Event Announcements & FAQs: Preparing announcement texts and frequently asked questions lists.

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Use Cases for Administrative Staff: Documents & Automation

1. Form and Document Explanations; Reporting Support: Transforming complex data into readable reports.
2. Handwriting Recognition & Digitization: Converting scanned handwritten documents into text.
3. PDF Content Recognition & Automated Form Data Extraction: Extracting relevant info from long documents.
4. Document Classification & Chatbot Support: Categorizing incoming documents; providing instant automated answers to FAQs.

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ACADEMIC PUBLISHING PROCESS

The 10-Step Academic Publishing Process

From conceptualization to publication:

1. Identifying Research Topics — 2. Conducting Literature Review

3. Conducting Experiments, Tests & Analyses — 4. Writing Up Tests & Analyses

5. Writing Up Literature Review — 6. Citing and Formatting References

7. Editing Document and Formatting for Journal

8. Submitting Document to Journal — 9. Revising based on Reviewer Reports — 10. Publication

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Step 1: Identifying Research Topics

1. When searching for new publication ideas, examining prominent topics in literature provides a major advantage.

2. Entering a keyword (e.g., 'data mining') presents related subtopics as a visual network.

3. These visual networks reveal how subtopics intersect with various disciplines (computer science, biology, information science), uncovering interdisciplinary collaboration opportunities.

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Step 2: Literature Review — General Approach

1. Conducting academic research properly directly impacts study quality.

2. Traditional method: Manual searching via keywords, terms, filters, abstract reading, and reference management tools (Mendeley, Zotero).

3. AI-assisted method: Searching via querying — directly asking about consensus, gaps, and relationships in the literature.

4. These approaches are complementary — most researchers draw a baseline map with traditional searches and deepen/accelerate it with AI tools.

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Literature Tool: Elicit (Systematic Reviews & Meta-Analysis)

Outstanding for multi-citation and data extraction features.

Provides summaries of research questions (typically 4-8 papers) and paraphrases from sources.

Multi-citation feature: Ability to construct a single sentence drawing on multiple sources — synthesizing and summarizing papers.

Data extraction feature: Can extract intervention methods or concepts from papers into columns — invaluable for systematic reviews and meta-analyses.

Works with your traditional PDF library (up to 25 PDF limit) — upload and extract data from your collected papers.

Ideal for: Researchers conducting systematic reviews or meta-analyses who need structured data extraction from numerous papers.

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LITERATURE TOOLS

Research Rabbit (Finding Research Gaps)

A free, gap-oriented tool — major advantage for limited academic budgets.

Finds related concepts for keywords, identifies who is working on the topic, and local collaborators.

Best feature: Highlights 'research gaps' — helps find valuable yet unexplored angles of heavily researched topics.

Offers filtering by year and author, collaborative spaces, and email alerts for newly published papers.

Belongs to Research Networks category: platforms visualizing and exploring relationships between researchers, papers, and research gaps.

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LITERATURE TOOLS

Gemini Deep Research: Next-Gen Autonomous Assistants

A very new and impressive capability: autonomously researches sources like PubMed, finds papers, extracts data, and generates text.

Can be used with natural language filters like 'go to meta-analyses', 'look at studies from the last 3 years' — no technical interface to learn.

Accesses open sources, though university database integration for full texts is still expanding.

Unlike classic search engines, delivers synthesized, cited answers rather than a mere list of links.

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TOOL CATEGORIES

Chatting with Papers: ChatPDF and NotebookLM

1. ChatPDF, NotebookLM, SciSpace: Ask questions directly to an uploaded PDF and extract insights.

2. Enables quick comprehension through targeted questions ('What is the main finding?', 'What was the sample size in methodology?') instead of reading a long paper end-to-end.

3. NotebookLM (Free): Google's tool; gathers multiple sources in a 'notebook', answers queries based on them, and even creates audio summaries.

4. Transforms into a 'research proposal robot': helps uncover overlooked opportunities with questions like 'What further studies can I produce from this?' or 'How can I do a similar study with my sample?'

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Writing Support Tool: Scite AI (Cited Draft Writing)

Actively used for writing discussion and introduction paragraphs for new research questions or findings.

Offers filters for continuous reference usage, date range, number of sources — e.g., 'use sources from the last five years'.

Displays generated text alongside cited sources, with export options to Mendeley and Zotero (high transparency).

Cost-effective option for academic budgets.

Use case: When you have findings but don't know how to start the discussion section, Scite AI provides a cited draft to rewrite in your own voice.

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Writing Support Tool: Quillbot (The Art of Paraphrasing)

One of the earliest AI-based paraphrasing tools (~10 years old).

Paraphrasing is the art of reexpressing text meaning using different words and sentence structures while preserving meaning.

Explicitly permitted by publishers — it does not generate content, it only changes the expression of existing thoughts.

Typical use case: Reexpressing a paragraph you wrote where you noticed repetitive vocabulary with more diverse phrasing.

Key caution: The paraphrased text must still be your idea — Quillbot changes the packaging, not the idea.

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WRITING SUPPORT TOOLS

Grammar & Style: Grammarly and Trinka

Grammarly: Evolved from a simple spell checker over 10-15 years into a comprehensive AI writing assistant.

Trinka: Recently popular, performs grammar checking, paraphrasing, and proofreading tailored specifically for academic writing at lower cost than human editors (includes Word add-in).

Clear examples of 'tool use': Grammar correction is a light-declaration, low-risk use case.

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WRITING SUPPORT TOOLS

Refy: Article Evaluation and Peer Review Support

Performs peer review simulation on articles before official submission.

Analyzes formal structure (Introduction, Methods, Results, Discussion).

Provides proofreading, title, abstract, and keyword recommendations, plus target journal/conference suggestions.

Strategy: Pre-test your paper with Refy to catch formal gaps (missing sections, inconsistent title-abstract) before peer review.

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TOOL CATEGORIES

Citation & Bibliography Tools: Mendeley, EndNote, Zotero

1. Crucial for publication quality — formatting errors create poor first impressions.
2. Mendeley: Elsevier's reference manager with social networking features; auto-tags PDFs.
3. EndNote: Long-standing tool favored for large thesis/book projects; strong MS Word integration.
4. Zotero: Free, open-source alternative; browser extension collects sources directly from web pages.
5. Not strictly LLM-based, but indispensable ecosystem components gaining AI metadata correction features.

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Data Analysis: Julius AI and Power Drill

Generates charts from raw data, analyzes data, and writes brief findings.

Determines data normality, suggests/performs appropriate statistical tests, prepares tables, and writes results paragraphs.

Typical workflow: Upload Excel/CSV -> 'Clean data & check missing values' -> 'Suggest & run appropriate test' -> 'Convert results into APA results paragraph'.

Saves massive time for those with statistical knowledge, but warning: gives results, but human must understand 'why' and 'what it means'.

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Data Analysis with ChatGPT: Opportunities & Risks

Can perform analysis like running ANOVA via Python libraries by uploading Excel data.

Risk of errors and hallucinations due to being a general-purpose model; domain-specific software is recommended.

Practical advice: Use ChatGPT for quick, low-risk exploratory analysis, but never publish final results without verification in specialized software (SPSS).

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TOOL CATEGORIES

AI Detection Software and Limitations

1. Turnitin, Originality.ai, ZeroGPT: Software attempting to detect AI-generated text for academic integrity and exam security.

2. How they work: Compare text against LLM generation patterns using 'perplexity' analysis (AI text has lower perplexity due to predictability; human text has greater variety).

3. Serious limitations: High false positive and false negative rates. Rapid LLM evolution makes detection difficult.

4. 'AI Humanizer' tools attempt to bypass detection — a serious academic integrity risk that is strongly discouraged.

5. Practical result: Treat output as an additional indicator, not absolute proof.

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SECTION 3

Ethical Use

Good/bad examples and two real-world case studies

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ETHICAL FRAMEWORK

Core Principles of Ethical Use

1. Generative AI is a powerful technology facilitating academic processes, requiring responsible, transparent, and ethical use.
2. Fundamental principles like academic integrity, originality, citation, and respect for human labor apply fully to AI use.
3. Ethical use positions AI as supportive, whereas misuse replaces human contribution or hides AI involvement.
4. Both students and academics must draw clear boundaries, be transparent, and clearly state AI contributions.

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Ethically Good Use Examples

WRITING & ANALYSIS SUPPORT:

- Grammar correction and enhancing academic phrasing in papers/theses.
- Summarizing long academic texts.
- Learning code/algorithm logic or understanding sample code.
- Translating scientific content or simplifying explanations.

IDEA & ORGANIZATION SUPPORT:

- Academics generating ideas for question banks.
- Students finding topics with advisor guidance.
- Drafting slide structures and topic flows.
- Formatting existing references to APA/MLA.

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Ethically Poor Use Examples (1)

HIDING CONTENT & CONTRIBUTION:

- Having AI write an entire thesis or paper without personal academic effort.
- Using AI output without citation, presenting it as original.
- Hiding individual contribution on assignments.
- Presenting AI as human (attributing AI analysis to oneself).

CITATION & PROCESS VIOLATIONS:

- Using deceptive citations (AI-hallucinated or unchecked sources).
- Writing thesis chapters with AI without advisor knowledge.
- Masking plagiarism risks.
- Data hallucination (using non-existent/unverified info from AI).

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Ethically Poor Use Examples (2)

AMBIGUITY & OVER-RELIANCE:

- Failing to specify study boundaries (presenting AI work as entirely human).
- Unclear distinction between 'help' and 'generation'.
- Relying on AI to think instead of oneself, hindering personal development.

BIAS & DATA RISKS:

- Uncritically using biased AI content on race, gender, religion.
- Inadvertently feeding sensitive/confidential data into AI (personal data, class performance).
- Carelessly uploading internal institutional decision documents.

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CASE STUDIES

Case Study 1: Social Media Data — Whose Permission?

Story: Sal, a PhD candidate, collected social media posts from Facebook on vaping and wants to upload them to ChatGPT to uncover themes.

Issue 1: Inappropriate Data Use — Users may not have intended their posts for AI tools, especially in private groups; platforms restrict data use; IRB approval is required.

Issue 2: Flawed Research Practice — AI is not neutral; built-in biases affect theme generation; AI lacks reflexivity required by qualitative paradigms like descriptive phenomenology.

General Lesson: An 'objective-looking' tool may carry hidden subjectivity.

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CASE STUDIES

Case Study 2: Over-Reliance on Statistics (Julius Example)

Story: Ram, an MPhil candidate with limited stats knowledge, uploaded an Excel dataset to Julius AI, ran tests, and added paraphrased output directly to his thesis.

Issue 1: Limited Skills & Career Impact — In a job interview years later, Ram claimed he used generative AI for analysis and was rejected because employers value someone who understands statistics and can spot AI errors.

Issue 2: Sensitive Data Security Breach — Ram uploaded sensitive personal/health data without checking privacy policies or data retention rules.

General Lesson: Tool capability is not a differentiator; the real value is evaluating and questioning results.

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General Lessons from Both Cases

1. Root cause: Lack of awareness, not malice (Sal and Ram missed risks rather than hiding intent).

2. Common Theme 1 — Consent & Scope: Taking data out of its original collection context violates original consent.

3. Common Theme 2 — Blind Trust: Using tool outputs without understanding underlying mechanisms carries ethical and practical risks.

4. Practical Solution: Query before use (consult ethics board, check data security) and verify after use (never publish without understanding).

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SECTION 4

Prompt Engineering

Seven principles, step-by-step with examples

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What is a Prompt?

A prompt is a meaningful and directive expression used to give a task to AI.

Keyword search is not a prompt; a prompt includes context, objective, and linguistic structure.

Users interact with LLMs via text interfaces, APIs, or voice commands.

Complex tasks can be solved through sequential, logical instruction chains ('Chain-of-Thought Prompting').

Why important? Two different prompts for the same LLM task can produce drastically different result quality.

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Four Elements of a Prompt

- Instructions: Core command telling the model what to do (e.g., 'classify the text').
- Context: Background info framing the task to help the model make correct decisions.
- Input data: The core content to be worked on (analyzed, transformed).
- Output indicator: Cue showing where the answer should start (e.g., writing 'Sentiment:' at the end).

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Prompt Principle 1: Be Concise

LONG & INDIRECT:

• 'Could you please provide a detailed explanation of the process of photosynthesis and the significance of this biochemical reaction?' (Polite but indirect; forces model to filter out filler words).

SHORT & DIRECT:

• 'Explain the process of photosynthesis and its importance in detail.' (Aim for brevity and direct imperative sentences for quick comprehension).

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Prompt Principle 2: Be Clear

VAGUE PROMPT:

• 'How do I write an article?' (Ambiguous phrasing forces the model to guess context/level, resulting in overly generic, unhelpful answers).

SPECIFIC PROMPT:

• 'Explain the general steps of writing a research article for a peer-reviewed academic journal.' (Avoid ambiguity; be specific to guide proper contextual answers).

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Prompt Principle 3: Add Context

1. Provide context to improve reasoning and build structured, consistent prompts.
2. Unstructured prompt without context: 'Discuss the tasks involved in writing a research article.'
3. Structured prompt with context: 'List the steps involved in writing a research article for a student assignment, starting with choosing a topic and ending with editing the final draft.'
4. Context can specify target audience ('for a beginner researcher'), time frame, or conditions.

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Prompt Principle 4: Split Complex Tasks

1. Avoid combining multiple tasks requiring different formats into a single prompt.

2. Example bad prompt: Design a marketing campaign, create social/print/TV examples, make a visual mockup, write alt text, summarize, and draft a 2-min pitch.

3. Solution: Break multi-step tasks into separate prompts or prompt chains (step-by-step).

4. Academic example: 'Extract literature summary' -> 'Write intro paragraph based on summary' -> 'Review paragraph for academic tone'.

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Prompt Principle 5: Specify Desired Output

- Style & Tone: 'Draft a paragraph about XYZ in the simple style of a tabloid newspaper. Use a sensational tone.'
- Depth & Length: 'Provide a high-level legal argument on XYZ not exceeding 500 words.'
- Format, Language, or Content Type: Three-column table, specific language, Python code snippet.
- Temperature concept: Balancing creativity and precision based on task requirements.

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Prompt Principle 6: Provide Examples

1. Useful examples support reasoning (few-shot prompting).

2. Prompt without example: 'Make a controversial claim about nutrition discussed by health experts.'

3. Improved prompt with example: 'Make a controversial claim about nutrition discussed by health experts, for example: "Chocolate is good for you".'

4. Difference: The example reduces ambiguity to near zero by showing the exact level of controversy and sentence structure expected.

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Prompt Principle 7: Role Prompting

1. Giving the model a persona and scenario is a quick way to fine-tune tone, depth, style, and knowledge domain.

2. Analogy: You are the film director, AI is your method actor.

3. Example prompt: 'I am a university student preparing for heavy exams. You are an open-minded instructor committed to academic integrity. What advice would you give to convince students not to misuse AI?'

4. Academic use: 'Act as an experienced journal editor and critique this abstract from a reviewer's perspective.'

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Evolution of a Prompt: Step-by-Step Improvement

• Initial: 'Write a paragraph about climate change.' (No principles applied).

• Step 1 (Style + Tone): 'Draft a paragraph about climate change in the simple style of a tabloid newspaper. Use a sensational tone.'

• Step 2 (Clarity + Context + Length): 'Draft a 500-word newspaper paragraph including a headline about the impacts of climate change. Use simplified tabloid grammar and sensational language.'

• Step 3 (Structured with markers): Clear separation of task, topic, style, tone, and constraints.

You don't have to write a prompt perfectly in one shot; improve it iteratively.

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Advanced Technique: Improving Prompts with AI

1. Meta-prompting: Ask AI to write a prompt for you by explaining your goal and desired outcome.
2. Iterative refinement: Run your prompt, evaluate the result, and ask 'How can I make this prompt better?'
3. Ask the AI to explain its understanding of your prompt before generating the final output.
4. CAUTION: Some tools auto-improve prompts in the background; be aware of changes and always verify results.

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SECTION 5

Academic Integrity and Declaration

Examining policies of five major publishers

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ACADEMIC INTEGRITY

Why Did Declaration Become Mandatory?

The 'AI Earthquake' — March 2023: ChatGPT added as third author on a submitted manuscript.

This incident forced major publishers and councils to release AI policy texts.

Generative AI tools cannot be listed as authors or cited as sources — authorship involves human-exclusive responsibilities.

Scientific authorities now focus on the value of research hypotheses, data origins, and test reliability rather than cosmetic writing details.

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ACADEMIC INTEGRITY

The Five Elements of an AI Declaration

1. Tool Identity: Name, version, and provider (e.g., 'ChatGPT, OpenAI, GPT-4o') — saying 'AI was used' is insufficient.

2. Purpose and Scope: Clearly stating in which section and for what purpose it was used.

3. Usage Boundaries: Stating tasks where AI was NOT used (e.g., 'not used in analysis/interpretation').

4. Verification Statement: Confirmation that content was reviewed and verified by authors — the most critical element ensuring accountability.

5. Placement: Cover letter and Methods section (similar to SPSS software).

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ACADEMIC INTEGRITY

Placement of Declaration: Cover Letter & Methods Section

1. Expected in cover letters and methods sections.
2. Accuracy is vital; future audits may check consistency.
3. Some journals require a separate 'Declaration of AI Use' heading (after Methods, before Acknowledgments).
4. Practical tip: Add a permanent 'AI Usage Declaration' section to your manuscript template.

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PUBLISHER POLICIES

COPE (Committee on Publication Ethics)

Position statement built on three principles: AI cannot be authors; authors bear full responsibility for use; use must be transparently disclosed.

COPE also emphasizes that reviewers must not upload confidential manuscripts to external AI tools to prevent confidentiality breaches.

Applies to both authors and reviewers — the obligation is spread across all review stages.

Serves as the 'gold standard' baseline for many publisher policies.

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PUBLISHER POLICIES

ICMJE (International Committee of Medical Journal Editors)

Requires authors to state tool name, version, and manufacturer, along with specific purpose.

ICMJE authorship criteria (4 points): (1) conception/analysis, (2) drafting/revising, (3) final approval, (4) accountability.

While AI can simulate parts of 1 and 2, it can NEVER meet criteria 3 and 4 — hence cannot be an author.

Essential framework for medical and health sciences publishing.

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PUBLISHER POLICIES

Elsevier

Usually requires a separate section titled 'Declaration of Generative AI in Scientific Writing' before Methods or Acknowledgments.

Acceptable use: language improvement, readability enhancement.

Unacceptable use: image/figure generation (unless specified), original scientific analysis/interpretation.

As one of the world's largest publishers, this policy impacts thousands of journals.

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PUBLISHER POLICIES

Springer Nature

Explicitly states large language models will not be accepted as authors.

Usage must be disclosed in the Methods section or a separate declaration.

Applies stricter rules for image generation tools, especially in scientific figures and graphs (data integrity risk).

Broad interdisciplinary impact across its extensive journal network (including Nature).

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PUBLISHER POLICIES

Wiley, Taylor & Francis, SAGE

Adopt a shared common framework: transparency, accountability, and author responsibility triad.

Core logic: AI cannot be authors, use must be declared, ultimate human responsibility.

Particularly prominent in social sciences, humanities, education, linguistics, and sociology.

Reflects a broad international consensus across academic publishing.

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PUBLISHER POLICIES

Common Denominator of Five Policies

1. Nearly all policies require: (1) Tool identity (name, version, provider), (2) Purpose (language, code, literature review, analysis), (3) Verification (human confirmation).
2. Universal ban: AI cannot be listed as an author.
3. Universal expectation: Declaration is a mandatory part of submission.
4. Warning: Policies update frequently — always check journal's 'Guide for Authors'.

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DECLARATION EXAMPLES

Example: Weak AI Declaration

- 'AI was used in writing this article.'

Evaluation: Too vague, lacks tool identity, version, specific scope, and human verification statement.

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DECLARATION EXAMPLES

Example: Strong AI Declaration & Checklist

• 'ChatGPT (OpenAI, GPT-4o version, August 2026) was used solely for English language and stylistic editing in the preparation of this work. The tool was not used for research design, data collection, analysis, or interpretation. All AI-suggested edits were reviewed by the authors, and consistency with scientific content was verified.'

Evaluation:

✓ Tool identity (name + version + date)

✓ Purpose & scope (language editing only)

✓ Boundaries (not used in analysis/interpretation)

✓ Verification (reviewed by authors)

✓ Proper placement

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SECTION 6

Roles, Paradigm, and Future

Researcher, educator, and beyond

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Recommendations for Researchers

1. Review existing AI policies before publishing or undergoing peer review.
2. When in doubt about a tool or use case, double-check with publishers/editors.
3. Ensure AI usage is transparent to research collaborators and co-authors.
4. Cite and declare according to publisher, journal, and style guide rules.

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Recommendations for Educators

1. Read institutional policies and guide documents; encourage students to review them as well.
2. Establish your own stance on student AI use and include clear instructions in research assignments.
3. If permitting AI use, ensure students: (a) learn publisher AI citation rules, (b) understand the impact of prompt design on efficient/ethical practice.

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ROLES AND FUTURE

Paradigm Shift

1. AI spread sparked fears of replacing writer jobs — likened to math teachers protesting calculators in 1988.
2. Scientific authorities now focus on research hypotheses and data reliability rather than cosmetic writing details.
3. Shift in academic evaluation: from 'is it well-written?' to 'is it truly valuable and reliable?'
4. Good news: Genuine research quality takes precedence over superficial writing skills.

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Future Perspective

1. According to Yuval Noah Harari, for the first time in human history, no one has an idea what the world will look like in 20 years.

2. Radical changes expected in healthcare, daily life, and education; some jobs face extinction while new ones emerge.

3. Academics who use AI are projected to have a distinct advantage over those who do not.

4. AI is a tool that empowers us rather than replacing us — the core message emphasized throughout this seminar.

5. Our strongest compass in this uncertainty: the five core principles — transparency, verification, knowing boundaries, effective prompting, and ethical awareness.

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Conclusion

1. AI is a natural part of academic processes; the question is not whether to use it, but how to use it correctly and transparently.
2. AI, ML, and DL are nested concepts; today's LLMs are specialized versions of the same core GPT engine.
3. Every tool fits one of four categories: language support, literature review, data analysis, or content generation — responsibility scales with category.
4. Blind trust in tools carries both academic and career risks — remember Sal and Ram.
5. Effective prompting is key: concise, clear, contextual, split, exemplified.
6. Usage must be explicitly, specifically, and verifiably declared.
7. Evaluation is shifting from 'how it is written' to 'how reliable it is'.
8. AI does not replace us — those who use it consciously will outperform those who do not.

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THANK YOU

Thank You

Assoc. Prof. Dr. Ömer Gökhan ULUM

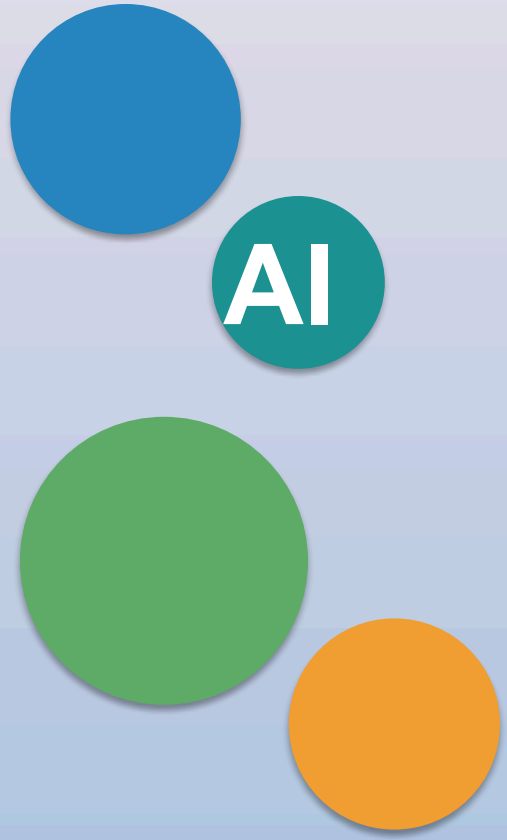
Mersin University, Faculty of Education · Department of English Language Education

Selected Sources: UOW Graduate Research School (HDR Helpful Hints), Dr. Nurettin Alabay, Dr. Ahmet A. Müngen.

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Data Privacy in Academic Research

Navigating privacy, artificial intelligence risks, and ethical frameworks in modern scholarship.



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Doç.Dr.FatmaARSLAN
KahramanmaraşSütçüİmamÜniversitesi

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Agenda & Key Topics

01. Concepts & Legal Basics
Raw data, privacy, and KVKK balance.

02. AI Data Leak Dynamics
Model training & reverse engineering risks.

03. YÖK & TÜBİTAK Frameworks
Ethics, authorship bans, and compliance.

04. Data Security Levels
Open vs. sensitive data & protocols.

05. Mitigation & Checklists
Anonymization and local AI solutions.

06. Case Studies
Real-world breach scenarios.

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Academic Data & Privacy Foundations

Core definitions and legal frameworks governing modern academic outputs.

Academic Data Types

Raw research data, participant personal information, institutional IP, and unpublished findings.

Privacy Fundamentals

Anonymization, data integrity, storage protocols, and preventing unauthorized access.

Legal Ground (KVKK)

Balancing Personal Data Protection Law (KVKK) with open science mandates.

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AI Mechanics and Data Leak Dynamics

How generative models process and potentially expose research assets.

01

Model Training Risks

Data entered into public LLM interfaces may be used for future model retraining.

02

Hidden Server Transfer

Article drafts or patent contents entered as prompts are sent to third-party servers.

03

Reverse Engineering

Vulnerability of sensitive training data being extracted from model outputs.

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Risk Areas in Generative AI

Specific vulnerabilities encountered during academic data processing.

Participant Privacy

Anonymity breaches when qualitative transcripts or survey responses are uploaded to AI.

Hallucination & Fabrication

Manipulation of research via generated fake participant profiles or fabricated datasets.

Intellectual Property Loss

Unpatented hypotheses or databases transferring to company licenses per terms of use.

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YÖK’s Approach to AI and Ethics

Institutional boundaries set for higher education researchers.

Direct Responsibility

Researchers bear absolute responsibility for AI-generated outputs used in their studies.

Authorship Ban

Generative AI tools cannot be listed as co-authors on articles, theses, or papers.

Transparent Disclosure

Mandatory declaration of how, where, and to what extent AI was utilized in the research.

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TÜBİTAK Ethics and Violation Boundaries

Project standards, data management plans, and integrity rules.

Fabrication & Plagiarism

Generating data via AI falls under "Fabrication"; transforming others' data via AI falls under "Plagiarism".

Data Management Plan

Commitment required upfront on data storage, sharing security, and protection protocols.

Auditability

Raw data processed by AI must remain available in verifiable formats during review processes.

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Data Security Levels and Classification

Segmenting data to determine appropriate processing protocols.

LEVEL 1

Open Data

Secondary public data carrying no privacy risks; fully compatible with AI analysis.

LEVEL 2

Sensitive / Restricted

Participant demographics, interview records; requires local models or closed systems.

LEVEL 3

High Risk / Confidential

Health records, judicial data, trade secrets; strictly prohibited from cloud-based AI tools.

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Legitimate Boundaries of AI in Research

Permissible applications versus restricted use cases.

Permissible Areas

Literature review support, grammar/style editing, code optimization, and general data pre-processing.

Restricted / Grey Areas

Summarizing raw qualitative data, interpreting statistical results, and processing participant quotes.

Methodology Role

Explicit disclosure of model name, version, access date, and integration steps in research methodology.

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Data Security Methods & Protocols

Technical measures to safeguard sensitive academic data.

Permanent Anonymization

Scrubbing names, institutions, geographic references, and indirect identifiers prior to processing.

Opt-Out Settings

Enabling privacy settings in commercial tools (OpenAI, Anthropic) to block model training usage.

Local Open-Source Models

Processing sensitive data via on-premise local models instead of external cloud servers.

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Institutional Ethics Committees & Consent

Evolution of informed consent and compliance requirements.

Informed Consent Evolution

Mandatory inclusion of clauses informing participants that data may be analyzed via AI tools.

Ethics Committee Approvals

Specifying both data collection tools and AI software utilized for analysis in application forms.

Institutional Warning

Prohibiting third-party data platforms without explicit university or institute ethics approval.

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Case Studies & Violation Scenarios

Common academic pitfalls leading to ethical breaches.

Case A: Data Leak

PhD student uploading interview transcripts to a public translation bot, exposing participant identities.

Case B: Fabricated Data

Completing missing survey responses via AI, resulting in project cancellation under TÜBİTAK rules.

Case C: Copyright Breach

Summarizing a manuscript draft under peer review via AI, breaching confidentiality agreements.

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CONCLUSION & CHECKLIST

Future Outlook & 3-Step Control

1. Data Check

Is data cleaned and identifiers removed?

2. Tool Check

Does the platform store data securely?

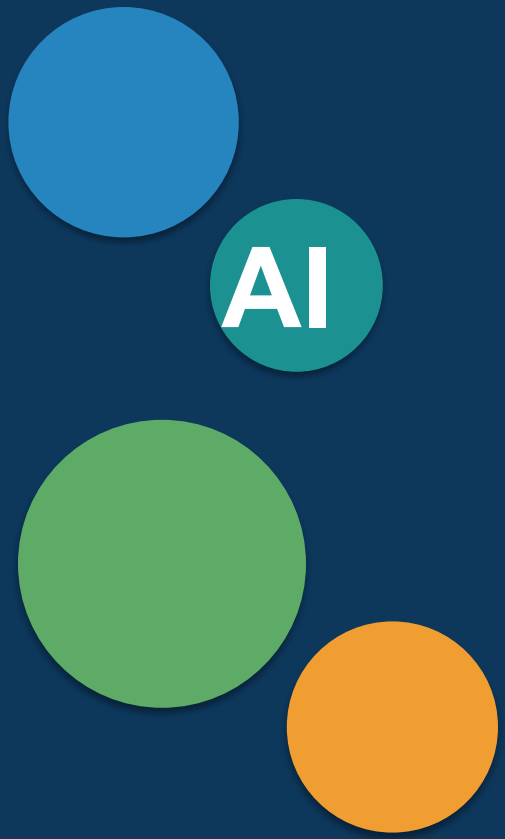
3. Declaration Check

Is AI usage scope clearly stated in reports?

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Artificial Intelligence and Research Topic Selection

Theoretical Framework, Tools, and Methodological Approaches



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What Will We Discuss in This Lecture?

Theoretical Foundation & Literature Gap: Accumulation of scientific knowledge and the concept of 'research gap'

Architecture of Tools: Google Gemini (macro discovery) & NotebookLM (source grounding)

Hybrid Literature Model: Transition from wide-angle idea scanning to micro-level text mining

Academic Prompt Design: The P-C-R Model: Persona, Context, Requirement, and Restriction

Types and Detection of Literature Gaps: Mapping methodological, contextual/sample, and theoretical deficiencies

Source Verification & Intellectual Responsibility: In-text citation verification, index strengthening, and researcher autonomy

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Theoretical Background of Research Topic Selection

Cumulative Nature of Scientific Knowledge: Original topic generation stems from systematic analysis of existing literature, not accidental ideas.

Research Gap: Unresolved contradictions, methodological shortcomings, or untested contexts in the body of knowledge.

Role of AI: An analytical assistant that eases cognitive load, accelerates multi-source synthesis, and separates thematic patterns.

Traditional vs. AI-Assisted Topic Identification:

- *Traditional Approach:* Linear reading, focus on limited texts, synthesis constrained by the researcher's cognitive capacity.
- *AI-Assisted Approach:* Simultaneous multi-text scanning, unearthing hidden conceptual correlations, mapping contradictory findings.

Transformation: Moving from speed of information access to depth of critical information questioning.

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Google Gemini: Open Web and Macro-Level Idea Discovery

Working Architecture: Large language model foundation, instant open web access, and interdisciplinary connection capability.

Thematic Function: Filtering out saturated and over-studied topics in the literature, listing emerging research trends.

Conceptual Expansion: Suggesting the integration of theories and approaches outside the researcher's main discipline.

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NotebookLM: Source Grounding

Working Architecture: A closed-loop model that references only the user-uploaded set of PDFs, articles, and notes instead of the public web.

Evidence-Based Analysis: Structuring claims by directly citing pages and paragraphs of uploaded sources.

Hallucination Isolation: Reducing fabrications and fake reference risks to zero with the principle of not straying outside uploaded texts.

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Integration of Tools: The Hybrid Literature Model

Stage 1 (Macro Discovery - Gemini): Identifying a broad conceptual framework, alternative theories, and general theme areas.

Stage 2 (Micro Mining - NotebookLM): In-depth in-text analysis by uploading 10-20 core articles related to the selected field.

Output Synergy: Expanding vision with Gemini; grounding in academic evidence and text with NotebookLM.

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Theoretical Framework of Effective Prompt Writing

Nature of Model Output: AI performance is directly proportional to the semantic clarity and contextual constraints of the given prompt.

Random Querying: Produces superficial, cliché topic suggestions lacking academic value.

Structured Prompt: Provides targeted academic focus by assigning boundaries, methodology, theoretical basis, and a role to the model.

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Academic Prompt Architecture: The P-C-R Model

Persona (Expert Role): Academic identity to be assigned to the model (e.g., 'Methodology expert', 'Section editor').

Context (Context & Input): Study field, theoretical background, target sample, and analytical constraints.

Requirement (Desired Action): Format of the output (analytical comparison table, thematic coding matrix, argument list).

Restriction: Condition of not making speculative comments and staying strictly within provided parameters.

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Types of Research Gaps in Literature

Methodological Gap: Existing studies getting trapped in a single design (e.g., only quantitative surveys); lack of mixed or longitudinal designs.

Contextual / Sample Gap: Findings not tested for validity outside specific age groups, institution types, or geographies.

Conceptual / Theoretical Gap: Two separate theories not brought into contact with each other, or obvious inconsistencies between findings.

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Identifying Methodological & Future Study Gaps with NotebookLM

Cross-Analysis of Limitations: Synthesizing 'Limitations' sections in uploaded articles to list common methodological bottlenecks.

Synthesis of Future Calls: Mapping research recommendations from authors' 'Future Research' sections that support or contradict each other.

Citation Auditing: One-click verification of which article and page a identified research gap relies upon.

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Verification & Consolidation Protocol for AI Outputs

In-Text Verification: Researcher reading to check whether NotebookLM outputs contradict the context in the original article.

Index / Database Confirmation: Verifying that the discovered research gap is a genuine deficiency in Web of Science, Scopus, or Google Scholar indexes.

Originality Testing: Checking whether the identified gap is worthy of study, methodologically measurable, and compliant with ethical boundaries.

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Academic Autonomy and Intellectual Property

Assistant vs. Researcher: AI recognizes patterns, classifies data, and offers options; it cannot produce the ultimate research choice or value judgment.

Epistemic Responsibility: The theoretical accuracy of the thesis, article, and research question is entirely the researcher's own intellectual responsibility.

Conclusion: A strong research topic is shaped at the intersection of an advanced AI model and the researcher's critical filtering capability.

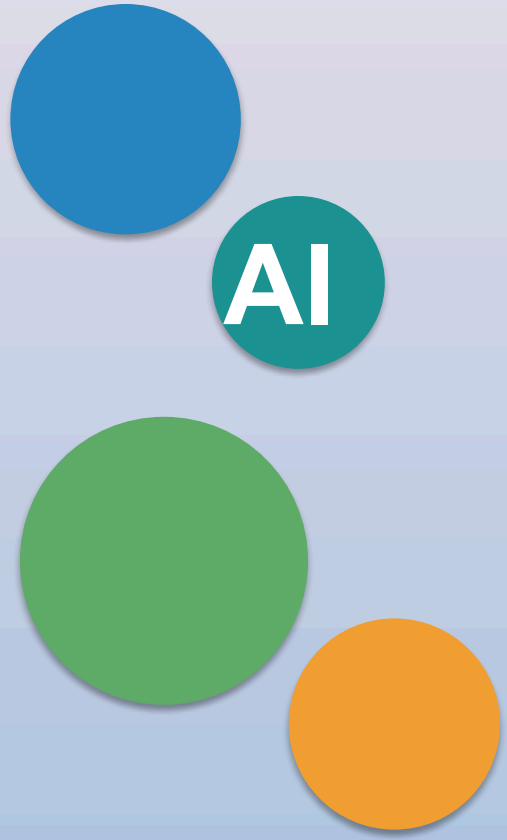
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Thank You!

Questions & Answers

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Artificial Intelligence and Methodology Determination Methodological Fit, Research Paradigms, and AI-Assisted Validation



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Doç. Dr. Fatma ARSLAN
Kahramanmaraş Sütçü İmam Üniversitesi

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What Will We Discuss in This Lecture?

Methodological Fit: Consistency between epistemological ground, research question, and method

Method Paradigms & Suitability Testing: Quantitative (hypothesis/generalization), Qualitative (context/depth), and Mixed designs

Decision Support Matrix for Method Selection: Discovery-verification balance, measurement tools status, and data characteristics

Red Teaming Prompts: Using AI as a critical reviewer to uncover methodological flaws

Source-Based Method Scanning: Extracting dominant method patterns and gaps in the field using NotebookLM

Validity Audit & Method Defense: Internal/external validity threats, feasibility limits, and method justification

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Theoretical Foundations of Methodology Determination & Epistemology

Ontological and Epistemological Ground: The nature of reality (objective/singular vs. subjective/plural) and the way knowledge is produced determine method selection.

Methodological Fit: Absolute logical consistency between the research question, theoretical framework, and chosen research design.

Role of Methodology: Technical architecture mandated to answer the research question, rather than an independent preference.

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Challenges in Determining Research Methods & Quantitative Logic

Habit / Convenience Trap: Directing towards a method known/familiar to the researcher without considering the nature of the research question.

Design-Question Mismatch: Selecting superficial quantitative surveys for phenomena requiring in-depth exploration, or limited qualitative designs for questions seeking generalizability.

Role of AI: Not a mechanism that selects the method instead of the researcher, but a methodological reasoning tool testing question-method consistency.

Quantitative Method Logic & Suitability Testing:

- *Core Philosophy:* Positivist/post-positivist paradigm; measuring relationships between variables, testing hypotheses, and generalizing to a population.
- *Characteristic Question Types:* 'How much?', 'At what level?', 'Is there a significant relationship/difference between variable A and B?'
- *AI's Testing Role:* Questioning testability of hypotheses, separation of dependent/independent variables, and sample/power analysis requirements.

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Qualitative Method Logic & Mixed Methods

Qualitative Method Logic & Suitability Testing:

- *Core Philosophy:* Constructivist/interpretivist paradigm; deep understanding of meaning world, context, processes, and participant experiences.
- *Characteristic Question Types:* 'How?', 'How do individuals make sense of this experience?', 'What are the dynamics of this process?'
- *AI's Testing Role:* Evaluating whether the question will produce rich contextual data, its susceptibility to phenomenology, theory building, or case study.

Mixed Methods Logic and Integration Criteria:

- *Core Philosophy:* Pragmatist paradigm; situations where a single method is insufficient to fully explain the research question.
- *Design Types:* Explanatory sequential, exploratory sequential, or concurrent triangulation.
- *AI's Testing Role:* Auditing whether the two methods are merely added together or integrated at a theoretical level (integration/mixing).

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Decision Support Matrix in Method Selection

Discovery vs. Verification: Distinction between discovering a poorly known phenomenon (qualitative) versus testing an existing theory (quantitative).

Measurement Tools Status: Presence of valid/reliable scales in the field (quantitative) or scale not yet developed (exploratory mixed/qualitative).

Depth vs. Breadth: High contextual depth in a limited number of cases (qualitative) or statistical representation in a broad sample (quantitative).

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Methodological Question Design and Testing Instructions with AI

Role Definition: Assigning the identity of 'methodology consultant' or 'research design expert' to AI.

Input Structure: Research objective, target audience, accessible data sources, and main hypothesis/sub-questions.

Analytical Query: 'What are the methodological blind spots and limitations that may arise when this research question is studied with a quantitative design?'

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Examining Method Patterns in Literature with NotebookLM & Red Teaming

Core Source Uploading: Transferring 10-15 seminal articles working on a similar theme into the system.

Method Scanning: Listing the most preferred data collection tools (scales, semi-structured forms) in the literature.

Methodological Gap: Mapping designs unused or left deficient in uploaded studies (e.g., lack of longitudinal design, lack of mixed methods) using NotebookLM.

Methodological Weakness Testing (Red Teaming with Gemini & LLMs):

- *Critical Testing:* Making AI criticize validity and reliability threats of the designed method.
- *Sample & Data Constraint:* Questioning whether the proposed sample size or data collection tool fulfills the research question.
- *Alternative Analysis:* Directing the question 'What would be the strongest alternative method design to answer this question and why?' to the model.

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Consolidation of Methodological Decision and Researcher Responsibility

Preventing Tool Fallacy: Applying a theoretical filter against AI's tendency to suggest the 'most popular' or 'easiest' method.

Applicability / Feasibility Testing: Overlapping time, budget, ethics committee approvals, and researcher competence with the chosen design.

Transfer to Methodology Section: Theoretical justification of why the chosen method is preferred over other alternatives (qualitative/quantitative/mixed).

Tool vs. Methodological Responsibility: AI compares logical probabilities and methodological alternatives; the final choice and ethical commitment are made by the researcher.

Method-Question Fit Principle: There is no such thing as the best method; there is the method that provides the most accurate answer to the research question.

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Researcher's Methodological Autonomy and Conclusion

Core Equation: Theoretical depth + AI's analytical comparison capacity = A strong, defensible, and consistent research design.

Conclusion: A robust research design emerges at the intersection of advanced AI capabilities and the researcher's rigorous methodological judgment.

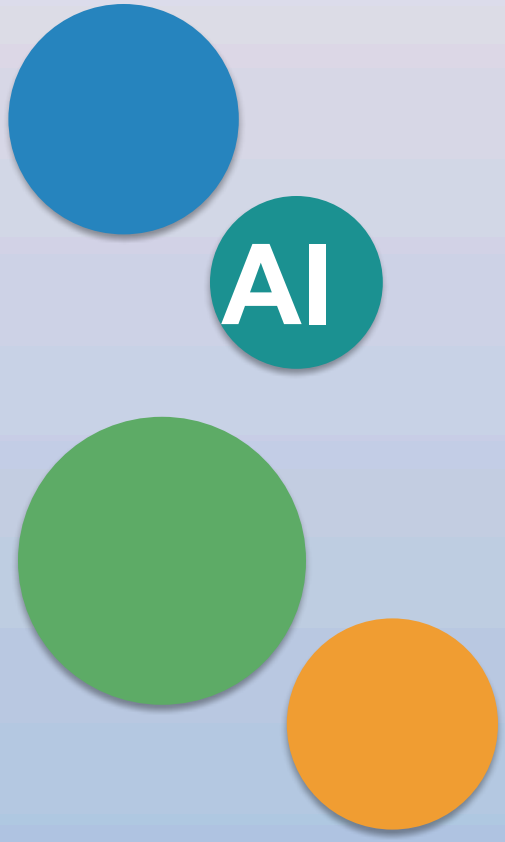
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Questions & Answers

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Artificial Intelligence and Data / Participant Determination



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Doç. Dr. Fatma ARSLAN
Kahramanmaraş Sütçü İmam Üniversitesi

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What Will We Discuss in This Lecture?

Theoretical Foundation: Representativeness, transferability, and systematic bias in data/participant selection

Sampling Architecture: Probability/power analysis in quantitative; purposive/criterion and saturation in qualitative

Multi-Modal & Digital Data Sources: Open archives, digital footprints, policy texts, and big data integration

Inclusion and Exclusion Criteria: Protecting research boundaries and optimizing criteria via AI

Representation Risk & Participant Bias Audit: Identifying blind spots, field access barriers, and alternative data pools

Ethical Boundaries & Methodological Decision: Vulnerable groups, informed consent, and final researcher choice

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Theoretical Foundations of Participant and Data Determination

Representativeness & Transferability: Power to represent the population in quantitative research; contextual depth and data richness in qualitative research.

Sampling Error & Bias: Invalidating all study findings due to faulty population or incomplete data source selection.

Role of AI: A methodological auditor that does not select participants, but logically filters sampling strategies, criteria, and data sources.

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Challenges in Data and Participant Determination

Convenience Sampling Trap: Tendency to select easily accessible groups (students, close circle) rather than those suited to the research question.

Ambiguity of Inclusion/Exclusion Criteria: Failing to clarify objective rationales for selecting participants or documents to analyze.

Sample Size Dilemma: Risk of insufficient statistical power in quantitative; inability to predict data saturation point in qualitative.

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Quantitative & Qualitative Participant/Data Determination Logic

Quantitative Logic & Suitability Testing:

- *Probability Sampling Designs:* Simple random, stratified, cluster sampling logic and population-sample fit.
- *Power Analysis & Sample Size:* Designing minimum participants required for statistical significance (G*Power logic).
- *AI Testing:* Questioning sample adequacy according to number of variables, effect size, and sub-groups.

Qualitative Logic & Suitability Testing:

- *Purposive Sampling:* Criterion sampling, maximum variation, snowball, or extreme/deviant case sampling.
- *Primary & Secondary Qualitative Data:* Participant interviews, focus group records, archive documents, corporate reports, digital traces.

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Multi-Modal & Digital Data Sources and Criteria Architecture

Beyond Traditional Data: Social media texts, forum discussions, open-access data repositories, corporate document archives.

Big Data & Text Corpus: Positioning thousands of pages of policy texts or user comments as a dataset.

AI's Discovery Role: Mapping alternative, open-access, and digital data pools that can answer the research question.

Role of Inclusion/Exclusion Criteria: Clarifying research boundaries, protecting internal validity, and minimizing bias.

Demographic, Contextual & Temporal Filters: Age, professional tenure, geographical location, experience duration, or publication year ranges.

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AI Prompt Design and Literature Trend Examination via NotebookLM

Prompt Design (Persona & Task): Assigning 'Sampling Design Expert' role to AI to define data profiles.

Input Parameters: Research question, theoretical framework, targeted method, and access constraints.

Analytical Query: 'While seeking answers to this research question, which participant profiles, if left out, would cause systematic bias in findings?'

NotebookLM Sample Trend Analysis:

- *Source Mapping:* Uploading 10-15 similar empirical studies into the system.
- *Sample Matrix Extraction:* Mapping who has been studied in literature (e.g., teachers) and who has been neglected (e.g., administrators, parents).
- *Sample Gap Detection:* Centralizing limitations of populations reached by literature using NotebookLM ('Limitations' sections).

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Participant Bias Audit and Ethical Compliance

Representation Risk Audit: Querying the model on which invisible groups are excluded by the determined participant profile.

Accessibility & Field Barriers: Pre-identifying institutional, legal, or cultural barriers in reaching the target audience.

Alternative Data Suggestion: Generating secondary data sources that can answer the same question in scenarios where participant access is restricted.

Ethics Committee, KVKK & Data Security Compliance:

- *Informed Consent:* Auditing whether participant profile includes vulnerable groups (children, patients, etc.).
- *Anonymization & Privacy:* Pre-determining de-identification protocols for data to be collected.
- *AI Boundary:* Rule that participant data or raw datasets cannot be directly uploaded to public AI tools due to privacy principles.

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Researcher's Methodological Decision and Conclusion

Core Equation: Research question + Target sampling strategy + AI bias audit = Valid, reliable, and defensible research data.

Tool vs. Researcher: AI shows possible sample pools and blind spots; the researcher makes the field representation decision.

Right Data Principle: Even the most sophisticated statistical or thematic analysis cannot correct errors produced by an incorrectly determined sample group.

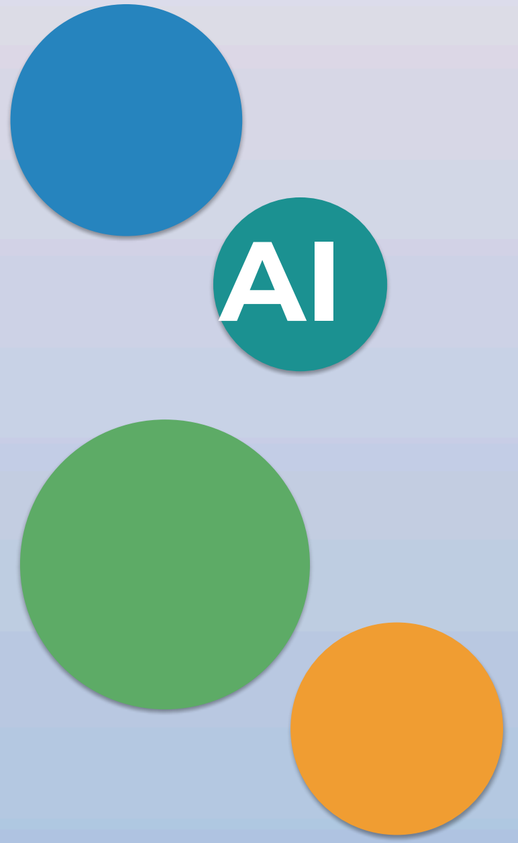
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Questions & Answers

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AI-Assisted Literature Review and Research Gap Identification in Higher Education



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01 · THE BOTTLENECK

Why literature reviews become a bottleneck

01

Keyword dependence

We must anticipate the language used by authors.

02

Terminological variation

One concept may travel under several names.

03

Scale

The literature grows faster than manual processing.

From keyword matching → semantic exploration and synthesis

AI assists—but never replaces—scholarly judgment.

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02 · EXPLORATION

From keyword search to semantic exploration

LLMs can surface alternative terms, conceptual relationships and thematic categories—then help reformulate questions and Boolean designs.



AI-generated suggestions are starting points, not evidence.

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03 · EPISTEMIC CAUTION

Useful does not mean true.

LLMs produce plausible explanations, references, connections and summaries. Plausibility is a language outcome—not a reliability test.

AI OUTPUT ≠ EVIDENCE

Evidence begins when a scholarly source is located, read and verified by the researcher.

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04 · RESEARCH CONTEXT

English Medium Instruction

EMI is increasingly central to global higher education—yet teaching academic content in English creates pedagogical challenges that extend beyond language proficiency.

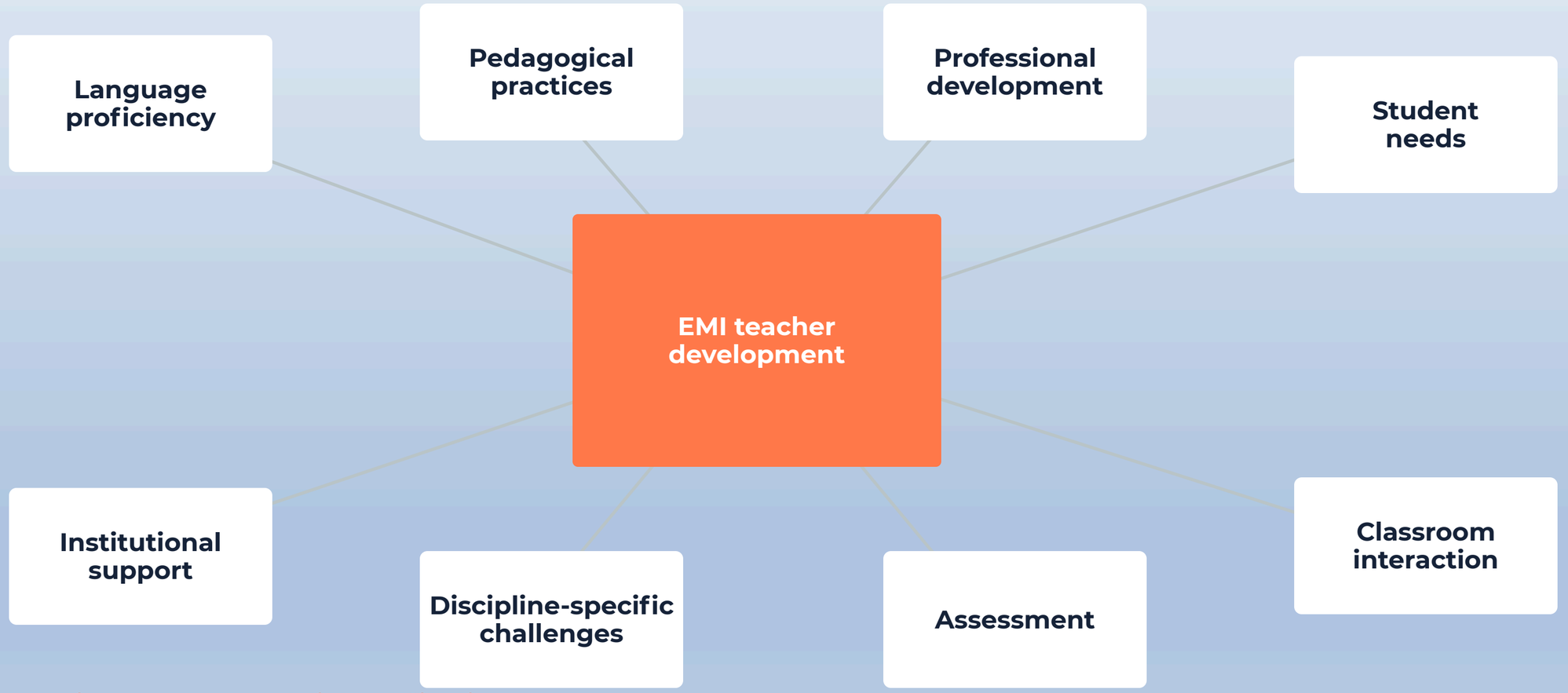
What does the literature say about EMI teacher development—and where are the gaps?



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05 · CONCEPTUAL SEARCH MAP

What are we actually looking for?



Search dimensions—not established findings

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06 · TWO MODES

Broad exploration vs source-grounded synthesis

EXPLORE

GOOGLE GEMINI

Broad scoping and terminology exploration
Alternative-term generation
Boolean search-string development
Thematic-axis identification

SYNTHESIZE

GOOGLE NOTEBOOKLM

Work with uploaded source documents
Source-constrained questioning
Document comparison and synthesis
Claim checking against the corpus

Different tools support different stages. Neither guarantees accuracy.

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07 · LIVE DEMO

Expanding the search space

TASK · Explore EMI teacher development literature, 2020–2026

01 Theoretical / conceptual models	02 Common terminology
03 Alternative terms	04 STEM vs social sciences
05 Possible research gaps	06 Boolean search string

Treat outputs as research-planning aids—not verified literature.

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08 · CRITICAL INSPECTION

Do not accept the search string automatically

("English-medium instruction" OR EMI OR "English medium education")
AND ("teacher development" OR "faculty development" OR "professional development")
AND (higher education OR university)

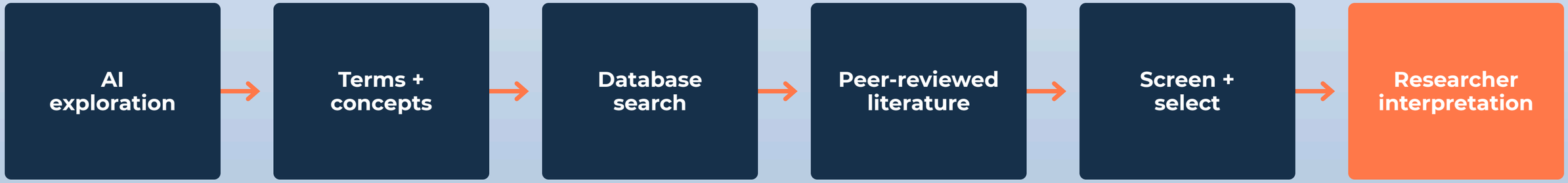
INSPECT → operators · quotation marks · parentheses · singular/plural · discipline-specific terms

Researcher judgment adapts the strategy to the question, database and field.

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09 · VERIFIED LITERATURE

AI suggests. Scholarly databases verify.



AI expands the search space; scholarly searching and interpretation remain researcher work.

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10 · LIVE DEMO

Source-grounded synthesis

EXAMPLE CORPUS · Macaro et al. (2018) + UNESCO (2023)



Focused question: What instructional obstacles and teacher-development needs appear across these sources?

Citation indicators guide verification; they do not substitute for reading.

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11 · PARTICIPANT ACTIVITY

12 minutes: build your own literature map

01 Choose a focused research topic

02 Use Gemini: terms, concepts, perspectives, gaps + Boolean search

03 Critically inspect usefulness and omissions

04 Select real scholarly sources

05 Use NotebookLM to explore one focused question

12:00

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12 · VERIFICATION CHECKLIST

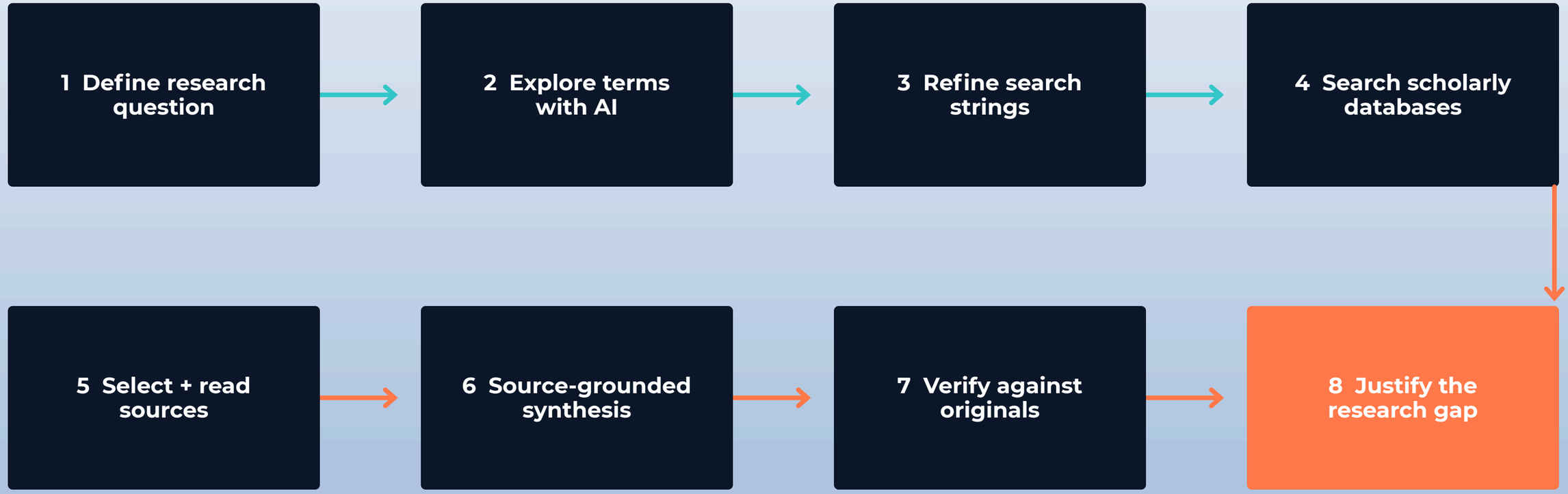
Before you trust an AI-assisted result

- ▫ Source exists
- ▫ Bibliographic details are correct
- ▫ Original source supports the claim
- ▫ Terminology fits the research question
- ▫ No unsupported AI interpretation
- ▫ Returned to the original source
- ▫ Can justify inclusion in the review

Verification is not an afterthought. It is part of the research method.

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A responsible workflow



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AI as a research assistant

AI CAN HELP WITH

Terminology exploration
Search-string development
Conceptual brainstorming
Organizing information
Comparing provided sources
Identifying possible patterns

THE RESEARCHER MUST

Define the research problem
Evaluate sources
Verify claims
Interpret evidence
Justify inclusion / exclusion
Formulate and defend the gap

AI accelerates parts of the review. Scholarly responsibility remains with the researcher.

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Discover → map → verify → analyze

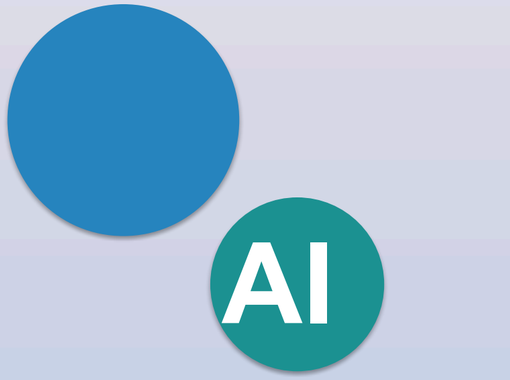
1. Keyword search can miss terminology and conceptual links.
2. LLMs help explore terms, concepts and search strategies.
3. Source-grounded tools synthesize a defined document set.
4. Scholarly-source verification remains essential.

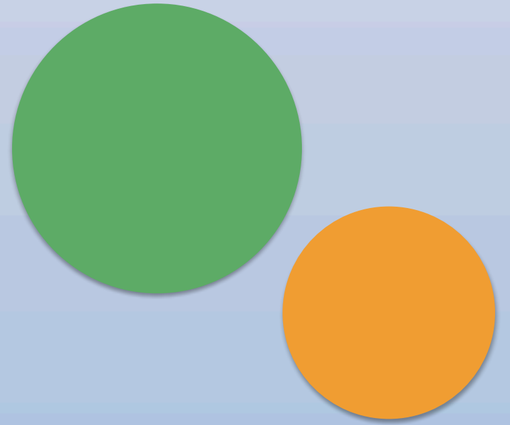


NEXT · Visualizing the scholarly landscape

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Visual Literature Mapping and Citation Networks





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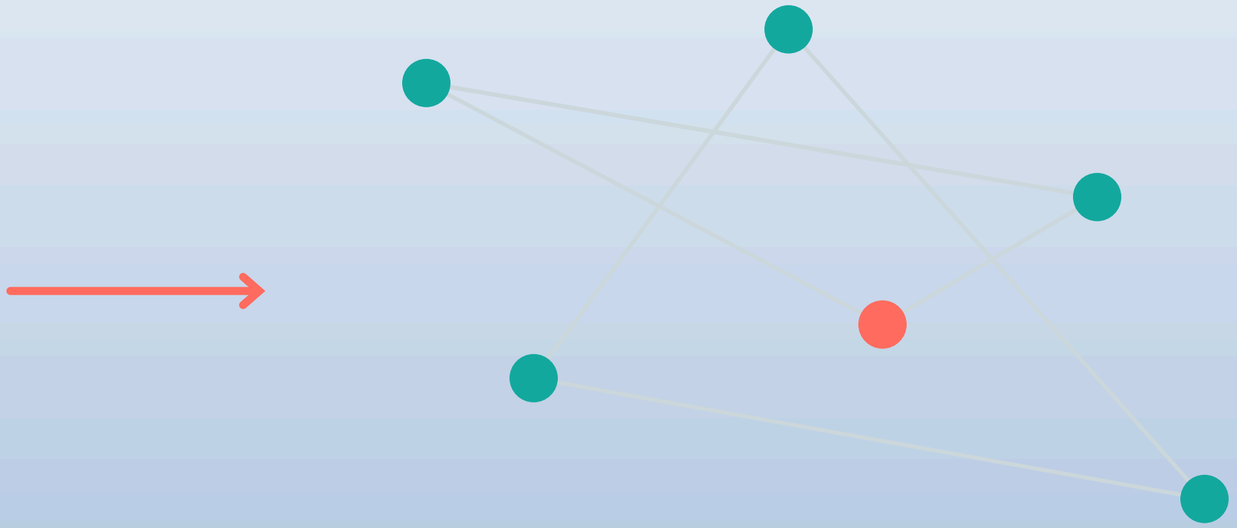
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From a List of Papers to a Scholarly Landscape

Conventional reviews often begin as lists. The structure remains hidden.

- Foundational studies
- Connections
- Idea development
- Author collaborations
- Intersecting strands

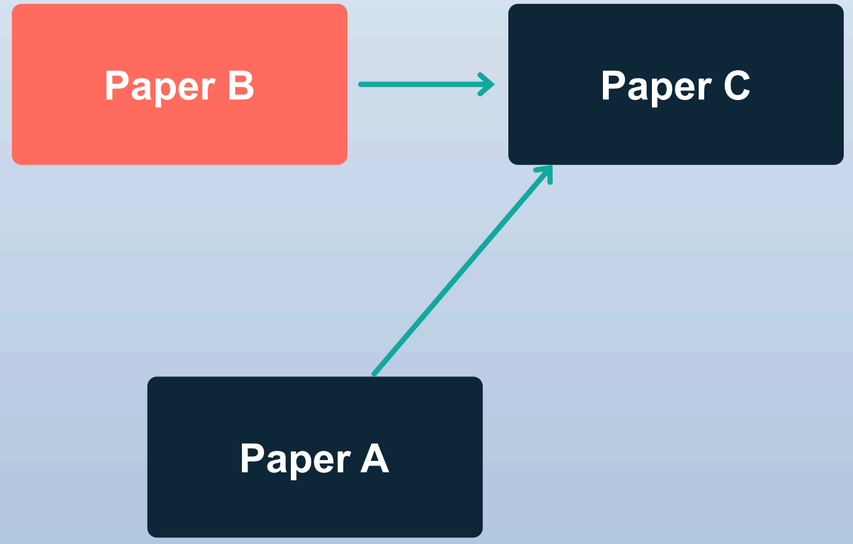


Visual mapping reveals literature structure — faster.

Bu belge, güvenli Elektronik İmza ile imzalanmıştır.
Evrak sorgulaması https://turkiye.gov.tr/ebd?eK=5637&eD=BSC0SC7MVZ&eS=576092 adresinden yapılabilir.

Think in Nodes and Connections

A network adds a second inspection method alongside reading and searching.



NODES

publications
authors
journals
institutions

CONNECTIONS

citations · co-citations
shared references
collaboration · similarity

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Four Questions a Literature Map Can Support

Use the map to ask better questions — not to outsource judgement.

01

Where did the research come from?

Foundational work

02

What studies are connected?

Related publications · shared references

03

Where is the research going?

Later studies · emerging branches

04

Who is connected?

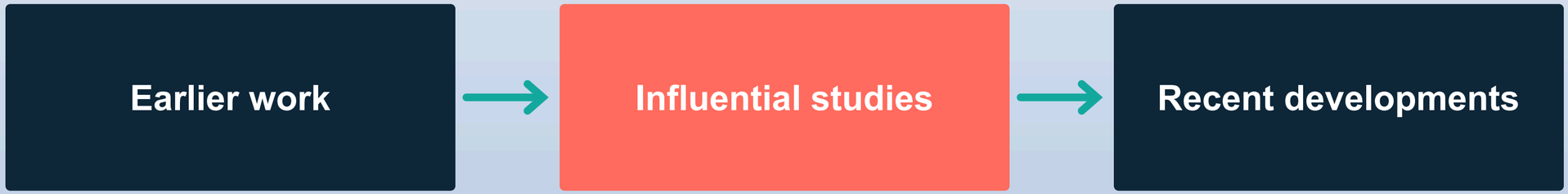
Authors · research communities

CAUTION Visual connection ≠ conceptual identity or equal importance.

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From Earlier Work to Later Developments

Citation relationships can trace intellectual roots, concepts, methods, applications and emerging directions.



“Follow the genealogy of an idea.”

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Not All Connections Mean the Same Thing

Interpret the relationship before interpreting the picture.

RELATIONSHIP	WHAT IT CAN INDICATE
Citation	One publication cites another
Co-citation	Two publications are cited together
Shared references	Publications draw on overlapping literature
Author network	Researchers publish or collaborate together
Similarity	Related content — method-dependent

Always verify what the visualization represents.

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ResearchRabbit as an Exploratory Mapping Tool

Explore connected publications and authors; curate promising paths into collections.

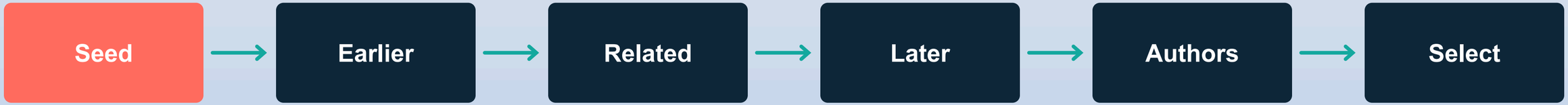


Use maps to discover what to read — not to decide importance without reading.

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Live Demo: Start With One Strong Seed

One credible publication becomes the entry point — not the conclusion.



SUGGESTED SEED

Macaro et al. (2018)

OR

10.1016/j.compedu.2023.104860

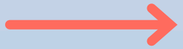
Verify publication details before the session.

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Demo Collection: EMI-Faculty-Development

Treat the collection as a working space — not a finished review.

1. Add seed publication
2. Explore earlier work
3. Explore related publications
4. Explore later work
5. Inspect authors
6. Select promising papers
7. **Add to collection**



EMI–FACULTY–DEVELOPMENT

CURATE · REVISIT · REFINE

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A Map Is a Research Aid, Not an Argument

Pause before turning a compelling visual pattern into a scholarly claim.

- Why are these papers connected?
- What relationship is shown?
- Relevant to my question?
- Is the cluster meaningful?
- Which papers need closer reading?
- What might be missing?

Visual proximity ≠ conceptual equivalence

Network prominence ≠ research quality

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12-Minute Activity: Explore Your Own Literature Network

Move quickly — but record why each discovery may matter.

12 MIN

01 Choose one relevant publication

02 Add it to ResearchRabbit

03 Explore earlier · related · later · authors

04 Select 3 potentially relevant papers

FOR EACH PAPER, RECORD

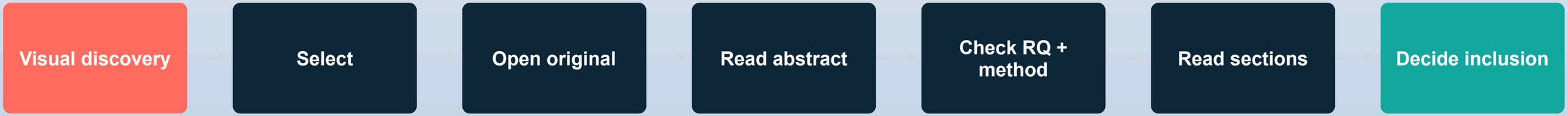
Why selected? • What relationship led to it? • What question can it help investigate?

Don’t collect papers just because they appear close on the map.

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The Map Must Lead Back to the Paper

Visualization supports discovery. Scholarly reading supports interpretation.

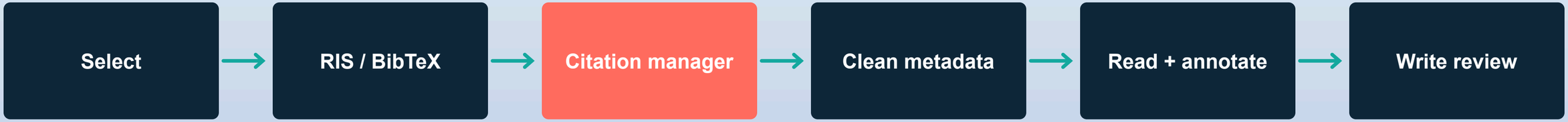


Discovery is a doorway. The paper is the evidence.

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From ResearchRabbit to Your Reference Workflow

Move selected records into a verifiable, organized citation workflow.



SESSION 3

Verify & manage citations with Zotero

CAUTION Exported metadata needs verification.

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Before You Trust an Export

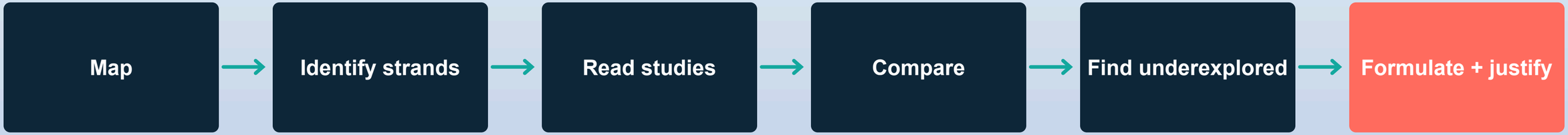
Discovery tools find literature. Metadata still requires checking.

- ☐ Author names
- ☐ Publication title
- ☐ Journal or book title
- ☐ Year
- ☐ Volume and issue
- ☐ Page numbers
- ☐ DOI or identifier
- ☐ Duplicate records

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How Can a Map Support Gap Identification?

A gap is not an empty space on a map. It is an evidence-based scholarly argument.



QUESTIONS · CONTEXTS · METHODS · FINDINGS

Engage with representative studies before claiming what is missing.

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Map widely. Read closely.

1 Move from lists to connected scholarship.

2 Trace development through citation and author ties.

3 Interpret proximity and prominence with care.

4 Return every discovery to the original source.

01 DISCOVER
AI-assisted exploration

02 MAP
Citation networks

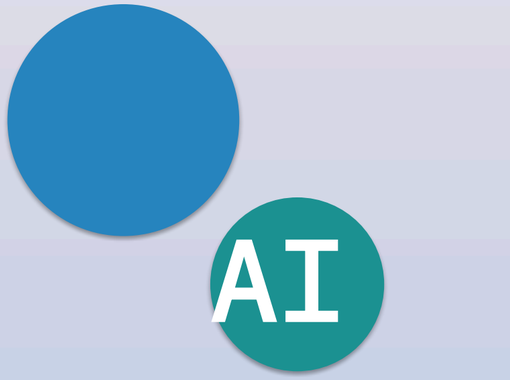
03 VERIFY & CITE
Zotero + responsible citation

04 ANALYZE
Qualitative analysis with ChatGPT

NEXT Deterministic reference management + responsible in-text citation

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AI in Referencing and In-Text Citations



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Doç.Dr.FatmaARSLAN
KahramanmaraşSütçüİmamÜniversitesi

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The citation problem

Large language models generate text probabilistically — including bibliographic details.

AUTHOR NAMES

PUBLICATION TITLES

YEARS & JOURNALS

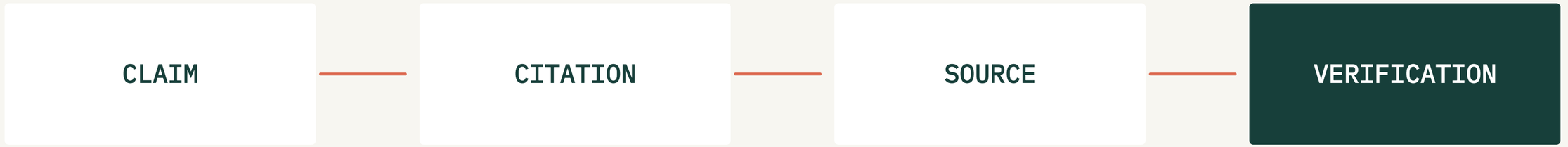
DOI-LIKE STRINGS

PLAUSIBLE
≠
VERIFIED

Fluent text does not guarantee bibliographic accuracy.

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Why bibliographic accuracy matters



Identify the source • Locate the publication • Verify claims • Understand the evidence base • Follow the argument

A citation is not decoration.
It is part of the evidence trail.

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DIVISION OF LABOUR

AI, Zotero, and the researcher

AI CAN HELP WITH

Language polishing
Paraphrasing
Citation locations
Style explanations
Search terms
Draft organization

ZOTERO CAN HELP WITH

Store & organize sources
Import metadata
Attach PDFs
Insert citations
Generate bibliographies
Apply citation styles

THE RESEARCHER MUST

Verify sources
Check metadata
Test claim support
Interpret evidence
Make citation decisions
Own the final text

AI can help write the sentence. Zotero can manage the reference. The researcher must verify the evidence.

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Zotero: a structured reference workflow



Zotero structures bibliographic work: capture, organize, cite, and format. It accelerates the workflow, but it is not infallible.

STRUCTURE ≠ AUTOMATIC ACCURACY

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LIVE DEMO

From publisher page to clean reference

01 Open publisher or journal page

02 Save with Zotero Connector

03 Open the record in Zotero

04 Inspect every metadata field

AUTHOR NAMES
TITLE & CAPITALIZATION
JOURNAL TITLE
YEAR • VOLUME • ISSUE • PAGES
DOI

Imported metadata should be checked before it becomes part of your academic writing.

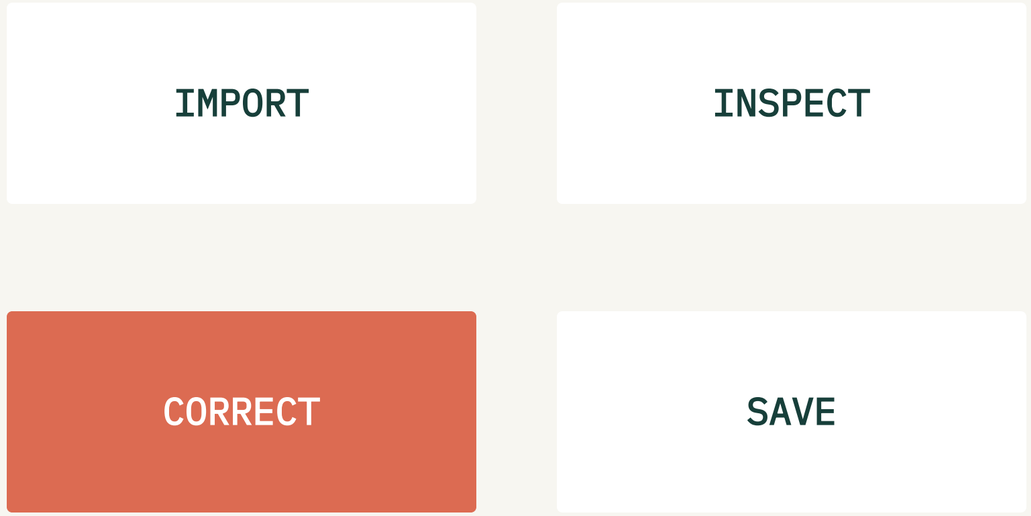
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Evrak sorgulaması https://turkiye.gov.tr/ebd?eK=5637&eD=BSC0SC7MVZ&eS=576092 adresinden yapılabilir.

QUALITY CONTROL

Clean metadata before you cite

COMMON PROBLEMS

Incorrect or incomplete author names
Incorrect capitalization
Missing publication details
Duplicate records
Incorrect DOI or page information
Inconsistent source types



Reference managers reduce manual work; they do not remove the need for checking.

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RESPONSIBLE PARAPHRASING

AI can polish language — not invent evidence

“Engineering lecturers reported difficulties adapting established teaching practices to EMI contexts.”

INSTRUCTION TO AI

Improve wording without adding claims.
Use: [INSERT CITATION: Macaro et al., 2018; Dearden, 2014]
Do not invent references, findings, or details.
Preserve the original meaning.

Separate language assistance from evidence selection.

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PARTICIPANT ACTIVITY

Paraphrase → Verify → Cite

1
Take a real finding

2
Ask AI to paraphrase

3
Require [Author, Year] placeholder

4
Open Zotero

5
Find authentic source

6
Insert citation

7
Check source support

Do not let the AI choose or invent the final reference.

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Two common in-text citation forms

PARENTHETICAL

EMI can create challenges for university teachers (Macaro et al., 2018).

Author and year appear in parentheses.

NARRATIVE

Macaro et al. (2018) discuss challenges associated with EMI in higher education.

The author is part of the sentence.

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A few rules to watch

THREE OR MORE AUTHORS

Use first author + et al. from the first citation.

Example: (Macaro et al., 2018)

SECONDARY SOURCES

Use only when the original was not directly consulted. Distinguish original work from the source consulted.

Whenever possible, locate and read the original source.

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VERIFICATION TEST

Does the source actually support the claim?

1
CLAIM
What exactly am I saying?

2
SOURCE
What source am I citing?

3
SUPPORT
Does it support this claim?

A real citation can still be inappropriate if the source does not support the claim.

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HUMAN-LED PROCESS

A responsible AI-assisted citation workflow



Verification remains a human research responsibility.

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TRANSPARENCY

Can you trace where the citation came from?



Check claim provenance • Confirm source support • Verify citation accuracy • Ensure bibliography completeness

Good reference management supports research transparency.

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AVOID

Five citation mistakes

1. Accepting an AI-generated citation without verification
2. Trusting imported metadata without checking
3. Citing a source that does not support the claim
4. Using a secondary citation when the original is available
5. Allowing AI to add evidence or claims absent from the source

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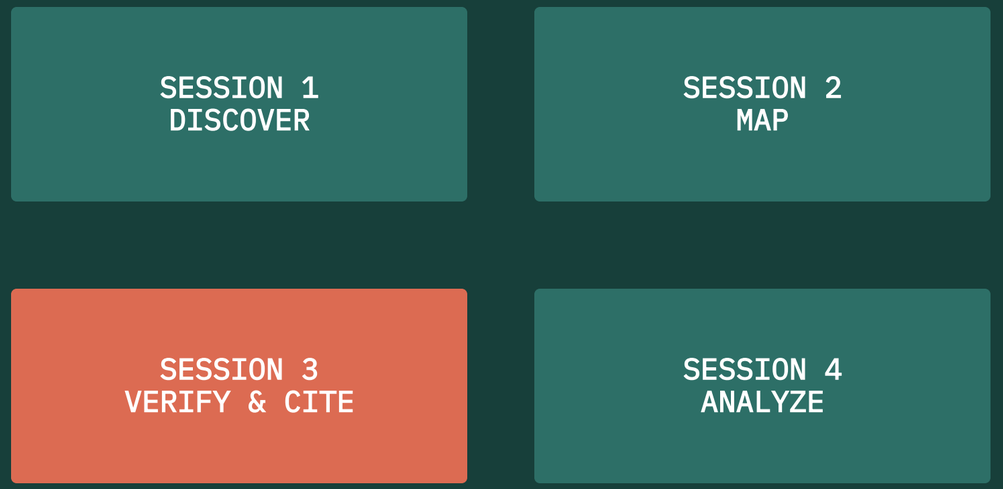
Verify before you cite

01 AI outputs require verification.

02 Zotero structures reference work.

03 Imported metadata must be checked.

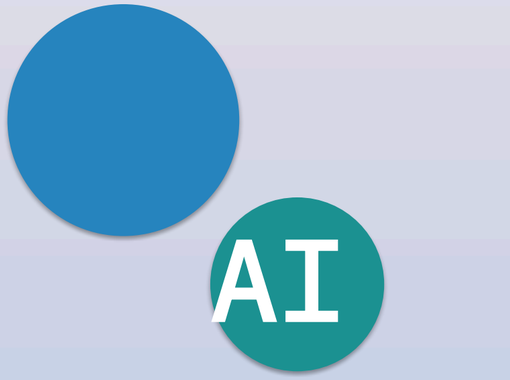
04 Accuracy depends on claim-source-evidence fit.

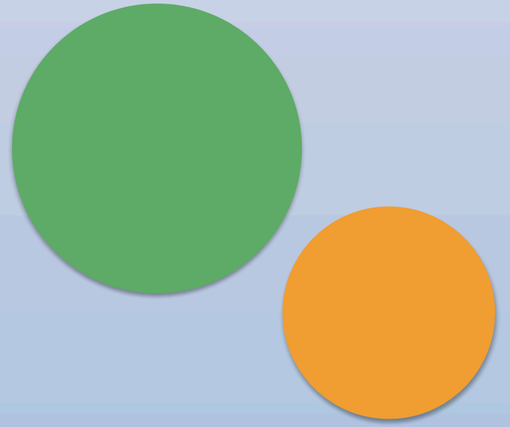


NEXT → Qualitative Data Analysis and Thematic Coding with AI

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Qualitative Data Analysis and Thematic Coding with AI





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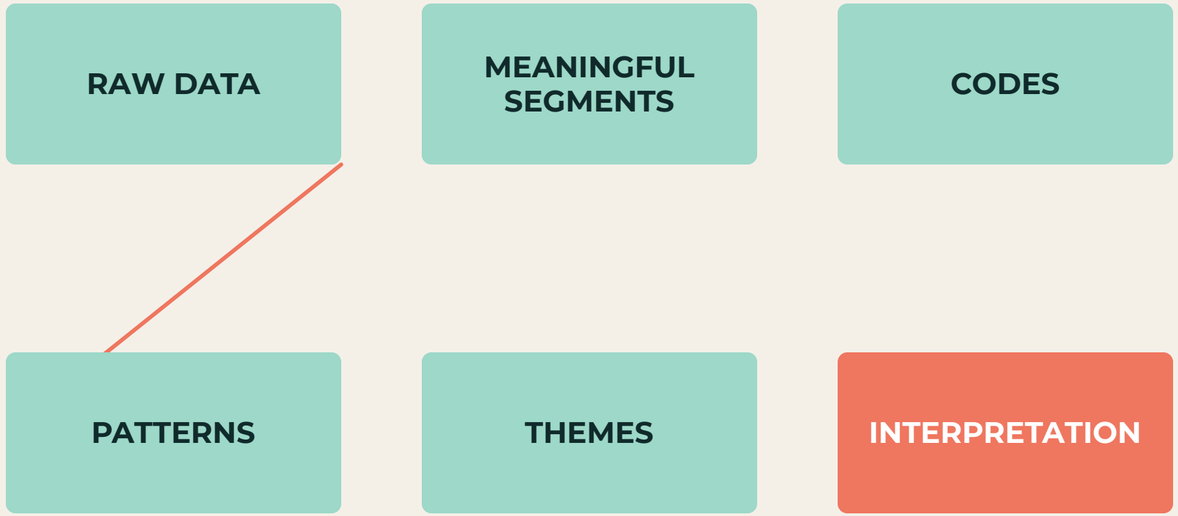
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KahramanmaraşSütçüİmamÜniversitesi

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01

What do we mean by qualitative data analysis?

Systematic work with data to understand meanings, experiences, perceptions, explanations, patterns, differences, and relationships between ideas.



Qualitative analysis is not simply counting words.

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02

How does a researcher move from data to meaning?

“At first, I mainly focused on explaining the content in English. Later, I realized that students were struggling to participate, so I started using more visual materials and checking understanding more often.”

“Students struggled to participate.”

Student participation difficulty

Pedagogical adaptation

Possible initial examples — not definitive codes

A code describes something meaningful in the data.

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03

Thematic analysis: one approach

A flexible method for identifying and interpreting patterns of meaning across qualitative data.



The goal is not simply to generate codes; it is to develop meaningful and defensible themes.

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04

What are we trying to understand?

RQ1 What factors do participants perceive as influencing the successful implementation of EMI in higher education?

RQ2 What advantages of EMI do participants perceive for teaching, learning, and/or institutional internationalization?

- what we attend to
- what we code
- how codes are organized
- how themes develop

Research questions guide analysis — but should not force responses into predetermined categories.

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05

Step 1: Familiarize yourself with the data

LISTEN TO THE INTERVIEW → **READ THE TRANSCRIPT CAREFULLY**

What is the participant actually saying?

What experiences are being described?

What problems or benefits are mentioned?

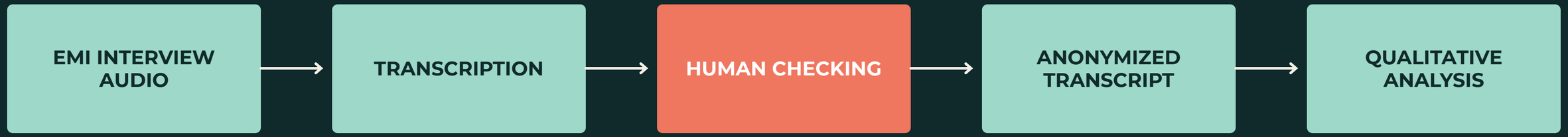
What ideas repeat — or surprise you?

Do not begin with coding before understanding the data.

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06

From interview audio to analyzable text



AI may assist only when privacy, consent, ethics, and institutional requirements allow.

Participants should check the transcript against the audio.

AI transcription is not automatically error-free.

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07

Ethics before AI-assisted analysis

01 Remove names and identifying details

02 Replace institutions and locations with labels

03 Follow approved research protocol

04 Follow informed-consent requirements

05 Follow institutional and data-protection requirements

```
[Participant_01]
[University_A]
[City_B]
```

Research ethics comes before analytical convenience.

Anonymization reduces — but does not eliminate — privacy risks. Never include identifiable or sensitive information unless the protocol explicitly permits it.

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08

A simple starting codebook

STARTER CODES ONLY — NOT PREDETERMINED FINDINGS

RQ1 — FACTORS AFFECTING EMI SUCCESS

Teacher preparation
English proficiency
Student readiness
Pedagogical adaptation
Institutional support
Teaching materials
Classroom interaction

RQ2 — PERCEIVED ADVANTAGES OF EMI

Internationalization
Student mobility
English development
Access to international knowledge
Employability
International collaboration

Add, remove, merge, split, or rename codes. The codebook evolves with data engagement.

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Using ChatGPT as an initial coding assistant

ChatGPT can help identify meaningful segments and suggest descriptive initial codes.

```
Analyze this anonymized EMI interview excerpt in relation to
these research questions:

RQ1: What factors do participants perceive as influencing the
successful implementation of EMI in higher education?

RQ2: What advantages of EMI do participants perceive for
teaching, learning, and/or institutional
internationalization?

Identify meaningful segments and suggest descriptive initial
codes.

For each code, provide:
```

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Using ChatGPT as an initial coding assistant

```
1. relevant quotation;
2. suggested code;
3. which RQ it relates to;
4. brief explanation.

Do not invent information or quotations.
Do not infer information unsupported by the transcript.
If the existing code scheme does not adequately capture a
segment, suggest a NEW CANDIDATE CODE.
```

Initial candidate coding only.

The researcher must verify every quotation and interpretation.

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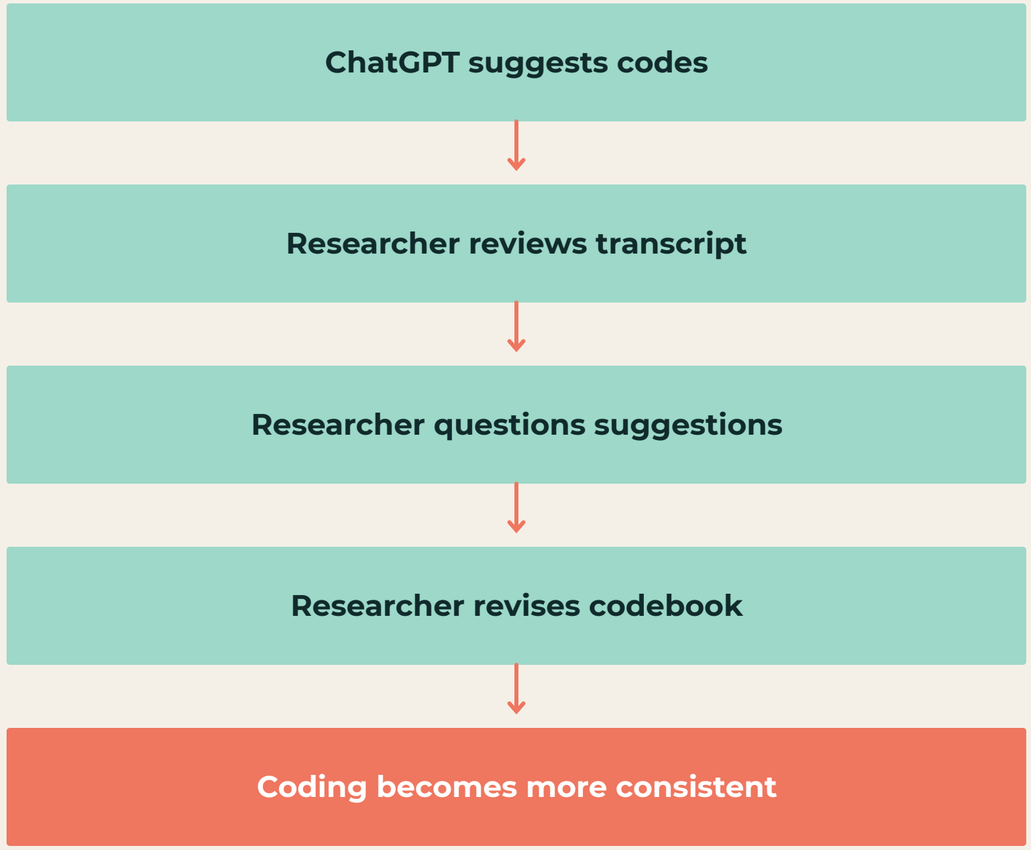
From interview segment to initial code

INTERVIEW SEGMENT	SUGGESTED CODE	RQ
“Students were reluctant to speak at first…”	Student participation difficulty	RQ1
“I started using more visual materials…”	Pedagogical adaptation	RQ1
“Students became more confident using English…”	English development	RQ2

Candidate codes, not final findings. Review: accurate? too broad or narrow? merge, split, or create a new code?

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Compare, question, revise



Where did AI miss something?

Where did it over-interpret?

Which codes are vague or overlap?

What important idea is missing?

Does the codebook still fit the RQs?

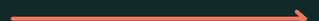
Disagreement is analytically useful.

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Codes are not themes

CODES
Smaller units describing meaningful aspects

Teacher preparation
Student readiness
Pedagogical adaptation
Institutional support



POSSIBLE BROADER PATTERN
Conditions supporting successful EMI implementation

Themes capture meaningful patterns across the dataset that answer research questions. Do not automatically turn similar codes into a theme; themes require interpretation and review.

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Where AI helps — and where the researcher leads

CHATGPT CAN HELP WITH

Organizing transcript segments
Suggesting descriptive codes
Comparing coding across excerpts
Identifying code overlaps
Revising wording
Organizing an audit trail

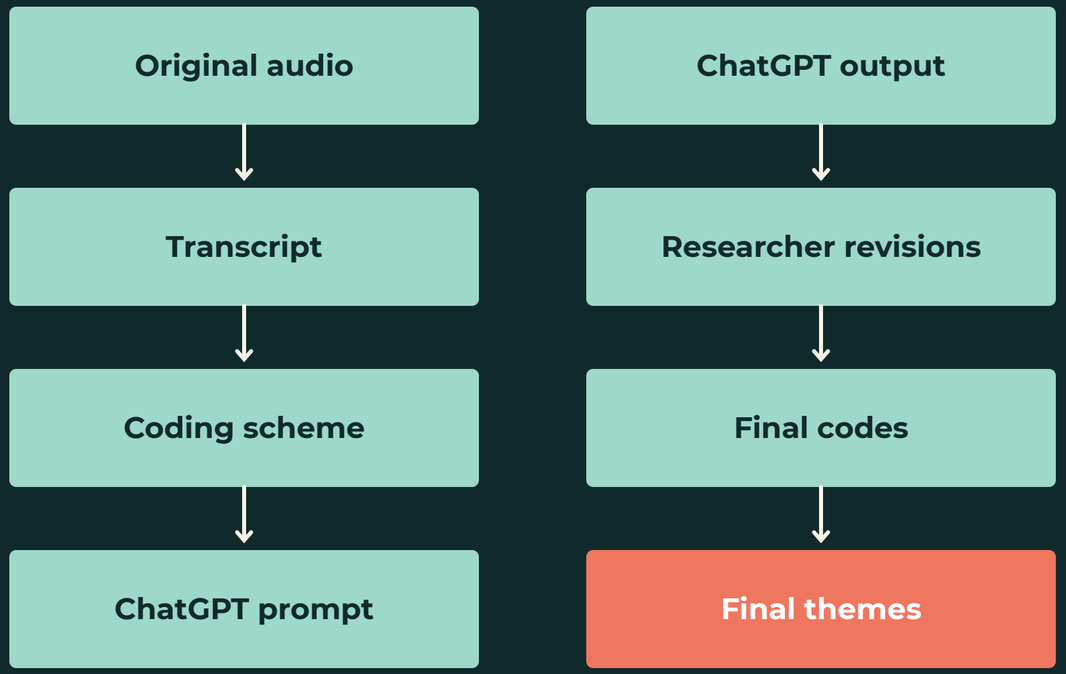
THE RESEARCHER MUST

Understand the dataset
Protect participants
Evaluate coding decisions
Interpret context
Revise the codebook
Construct and review themes
Justify decisions
Write the final interpretation

AI can assist with processing. The researcher remains responsible for interpretation.

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Make your analysis traceable



1. Listen to the interview
2. Transcribe
3. Check the transcript against the audio
4. Anonymize the data
5. Define the research questions
6. Start with a provisional coding scheme
7. Use ChatGPT to suggest initial codes
8. Compare AI suggestions with the transcript
9. Revise the codebook
10. Group related codes and develop candidate themes
11. Review and refine themes
12. Interpret the findings as the researcher

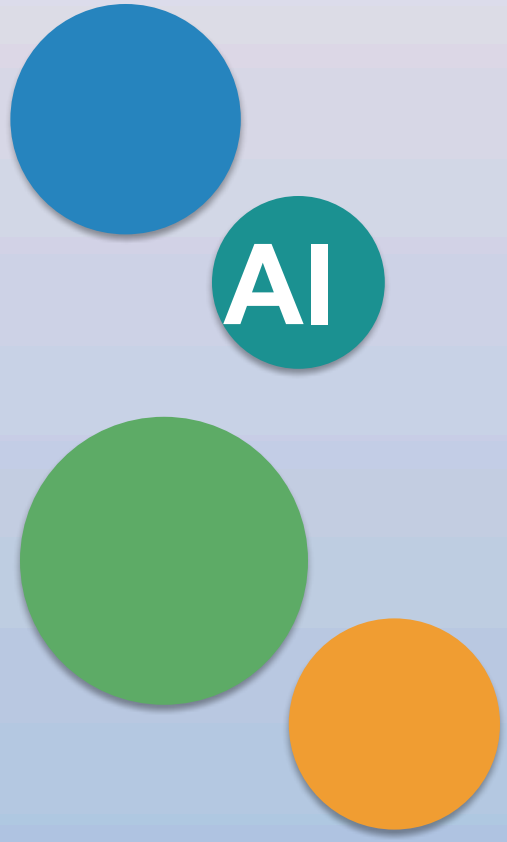
DISCOVER → MAP → VERIFY & CITE → ANALYZE

Keeping an audit trail documents decisions; it does not automatically establish rigor.

AI can help us process qualitative data, but researchers must make sense of the data.

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AI-Assisted Discourse Analysis Using Taguette for Qualitative Coding



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Doç. Dr. Fatma ARSLAN
Kahramanmaraş Sütçü İmam Üniversitesi

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Learning Objectives

- Understand the basic stages of qualitative discourse a
- Identify relevant linguistic features in a text
- Create and apply codes in Taguette
- Distinguish description, coding, and interpretation
- Use AI to generate possible coding suggestions
- Critically evaluate AI-generated interpretations

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What Is Discourse Analysis?

Language is examined as meaning-making in context.

What does the text say?

How does it say it?

What meanings does it construct?

Whose perspectives or interests are represented?

What social or ideological assumptions are present?

Core idea

Discourse analysis examines how language constructs meaning in context.

Look beyond the surface wording to representation, perspective, and assumptions.

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Example: Moving Beyond a Simple Reading

“Students can now take responsibility for their own learning.”

A simple reading

Students are encouraged to become autonomous learners.

A discourse-analytic reading

How is responsibility constructed?

Who is represented as responsible for learning?

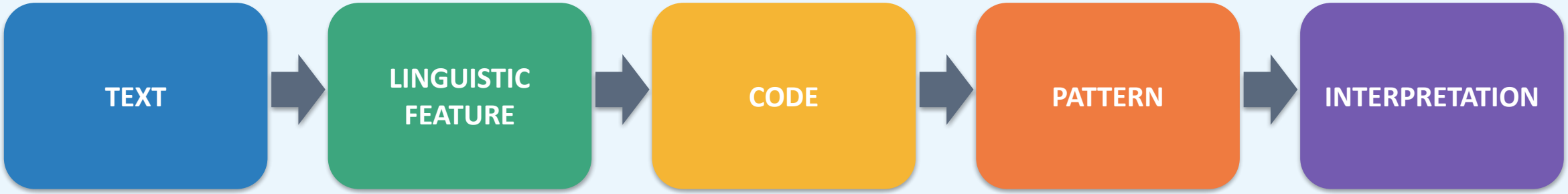
What role is assigned to the institution?

Is learner autonomy constructed as empowerment?

Could responsibility also be shifted from the institution to the individual?

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From Text to Interpretation



The key analytical move: connect observable linguistic evidence to patterns and contextual interpretation.

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Metadiscourse — Engagement

Hyland (2005): writers explicitly acknowledge and involve readers in academic discourse.

Reader pronouns

we, our, us, you, your

Directives

“Consider the implications of these findings.”

Questions

“How can researchers ensure ethical AI use?”

Shared knowledge

“As we know, AI is increasingly used in academic research.”

Personal asides

“This distinction, as you may recall, is important…”

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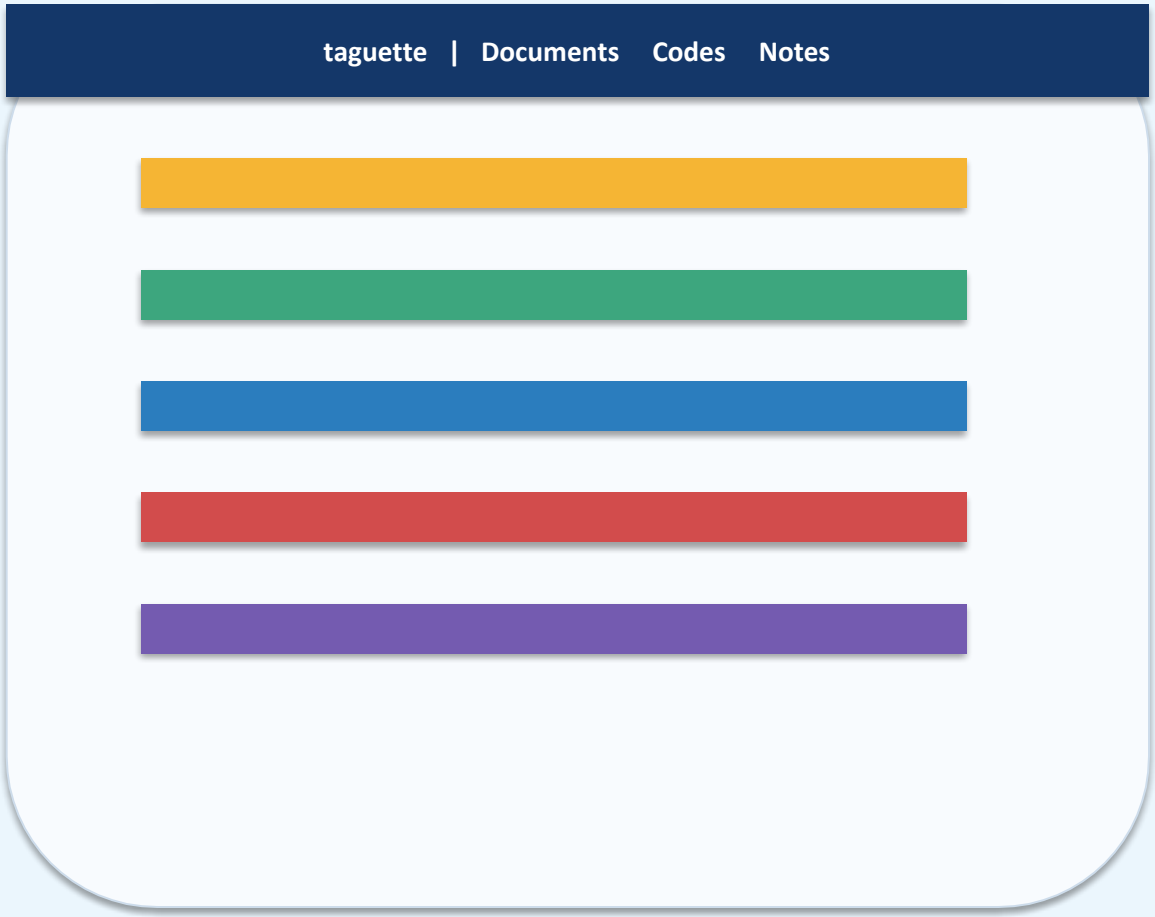
Introducing Taguette

https://www.taguette.org/#

What is Taguette?

A qualitative text-analysis tool that allows researchers to:

- upload documents
- highlight relevant excerpts
- create codes/tags
- apply tags to passages
- add notes
- organize qualitative data



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The Stages of Qualitative Discourse Analysis

1. Familiarization with the data
2. Identification of linguistic features
3. Coding (with tools like Tague
4. Pattern recognition
5. Interpretation (in context)

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AI Support in Coding

AI can help by:

- suggesting possible codes
- identifying key themes
- offering alternative phrasing
- supporting initial analysis

⚠ Critical principle

AI-generated interpretations should always be critically evaluated.

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Description vs. Coding vs. Interpretation

Description

What is in the text?

Observable linguistic features

(e.g., pronouns, modal verbs, lexical choices).

Coding

What does it represent?

Assigning meaningful labels to patterns

(e.g., engagement, responsibility).

Interpretation

What does it mean?

Explaining broader significance in context

(e.g., power relations, ideology, social implications).

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Mini Coding Exercise: Hyland's Engagement

TAGUETTE



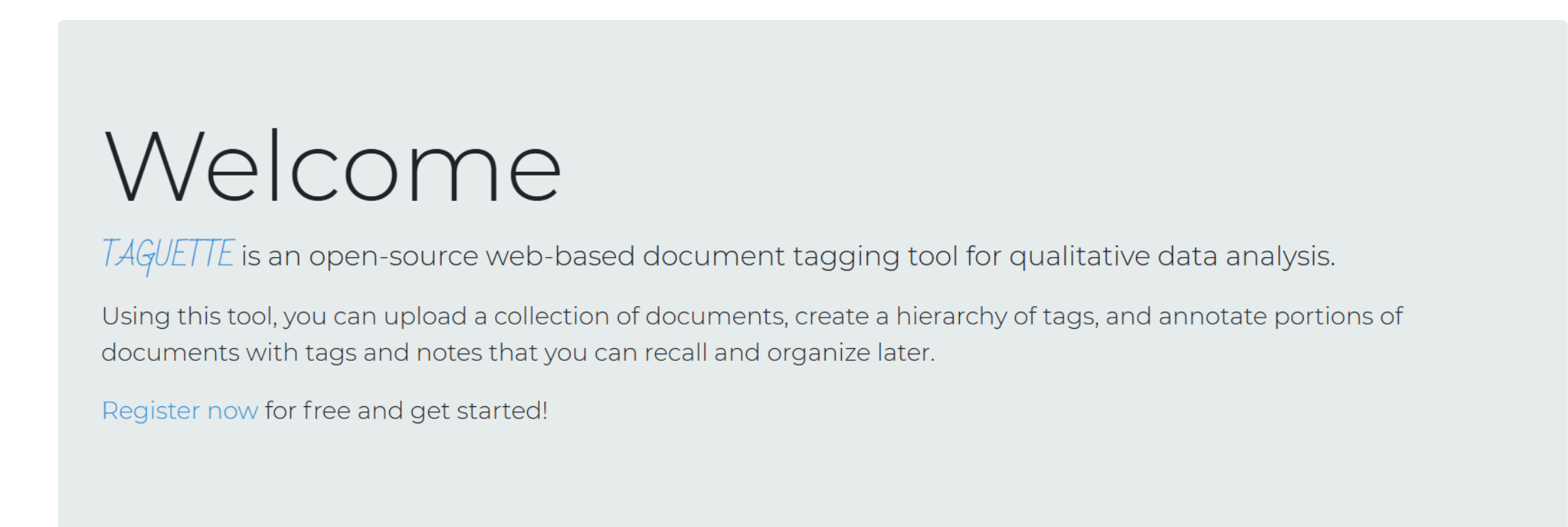
FEEDING YOUR QUALITATIVE NEEDS

Have you ever searched "free qualitative research software" only to be disappointed that nothing lets you tag your materials? Search no more! Taguette is a **free and open-source** tool for qualitative research. You can import your research materials, highlight and tag quotes, and export the results!

Learn more » | Try out Taguette on our server

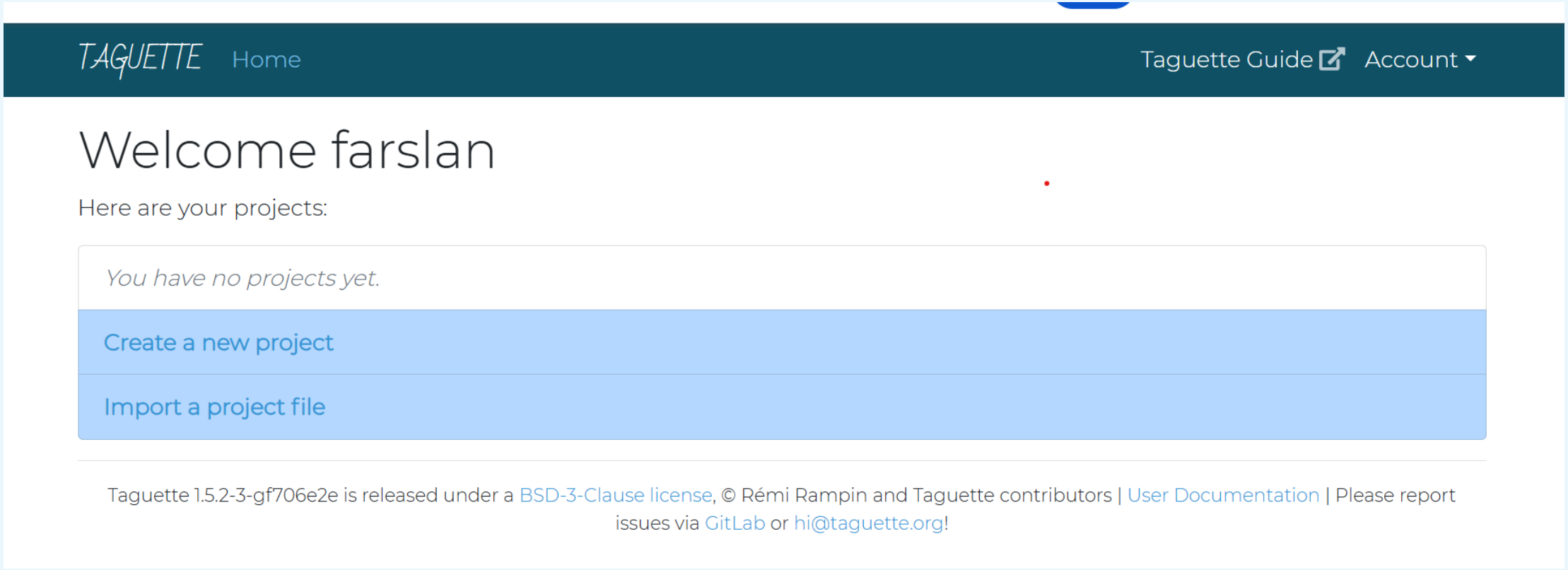
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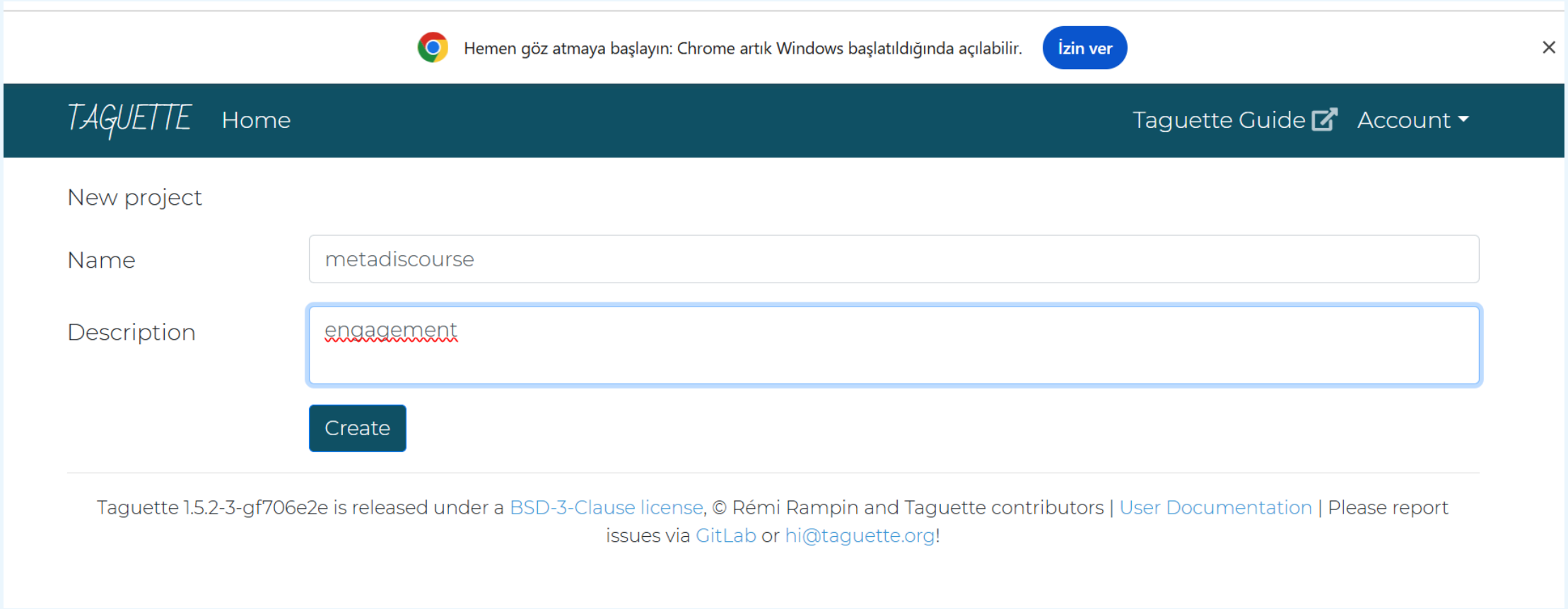
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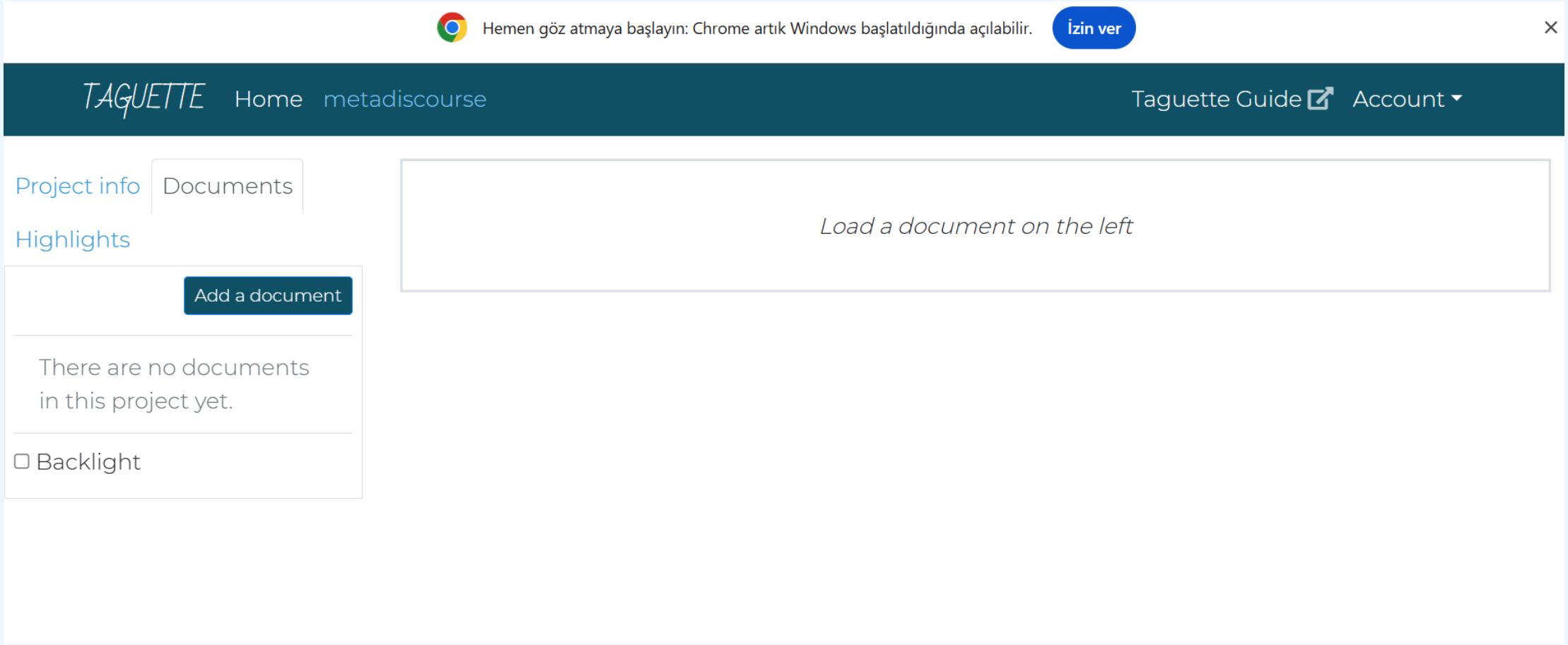
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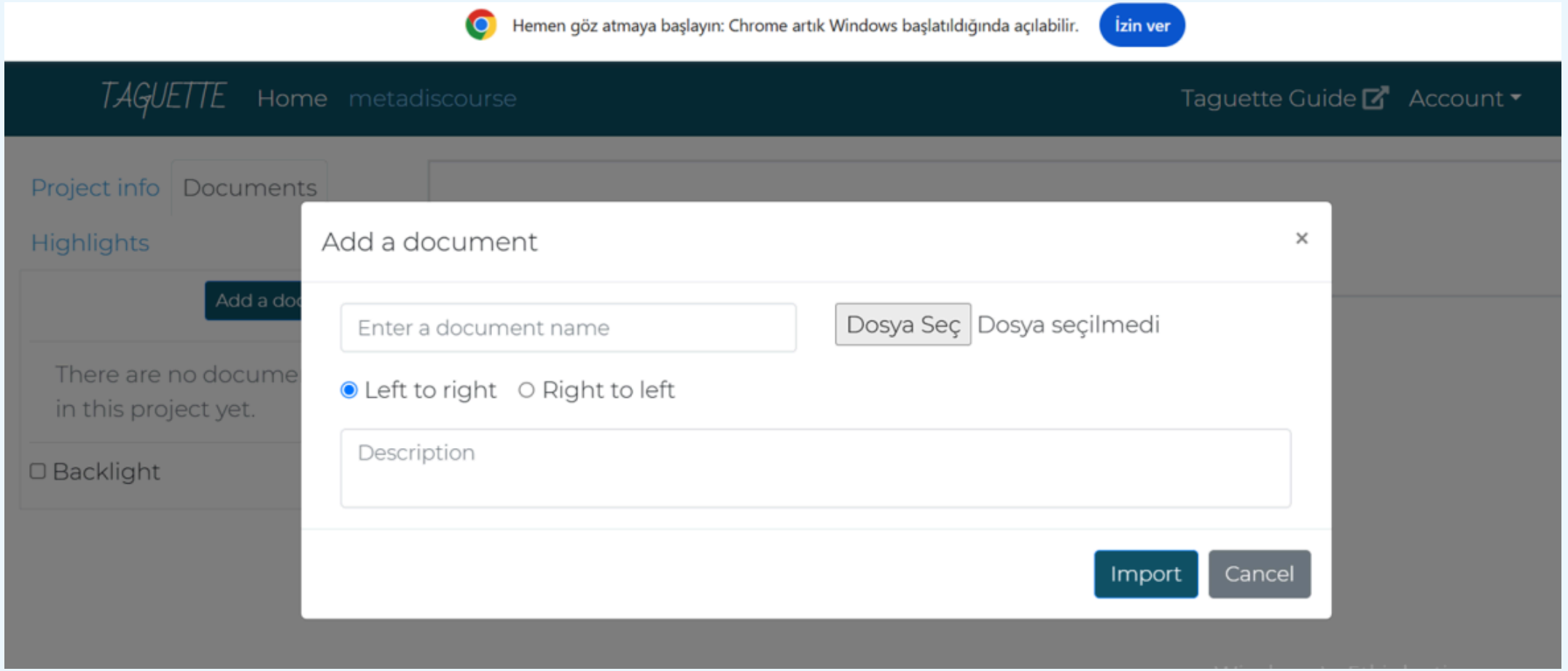
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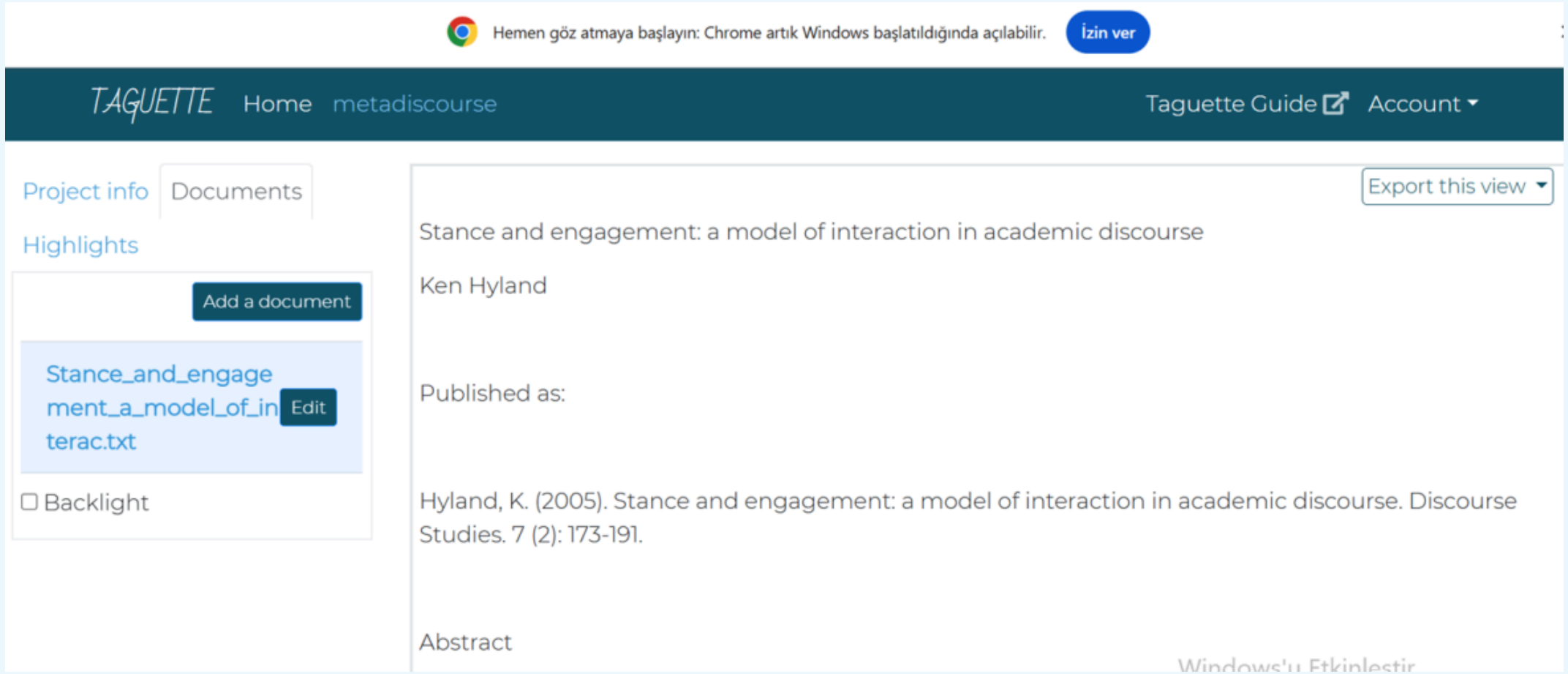
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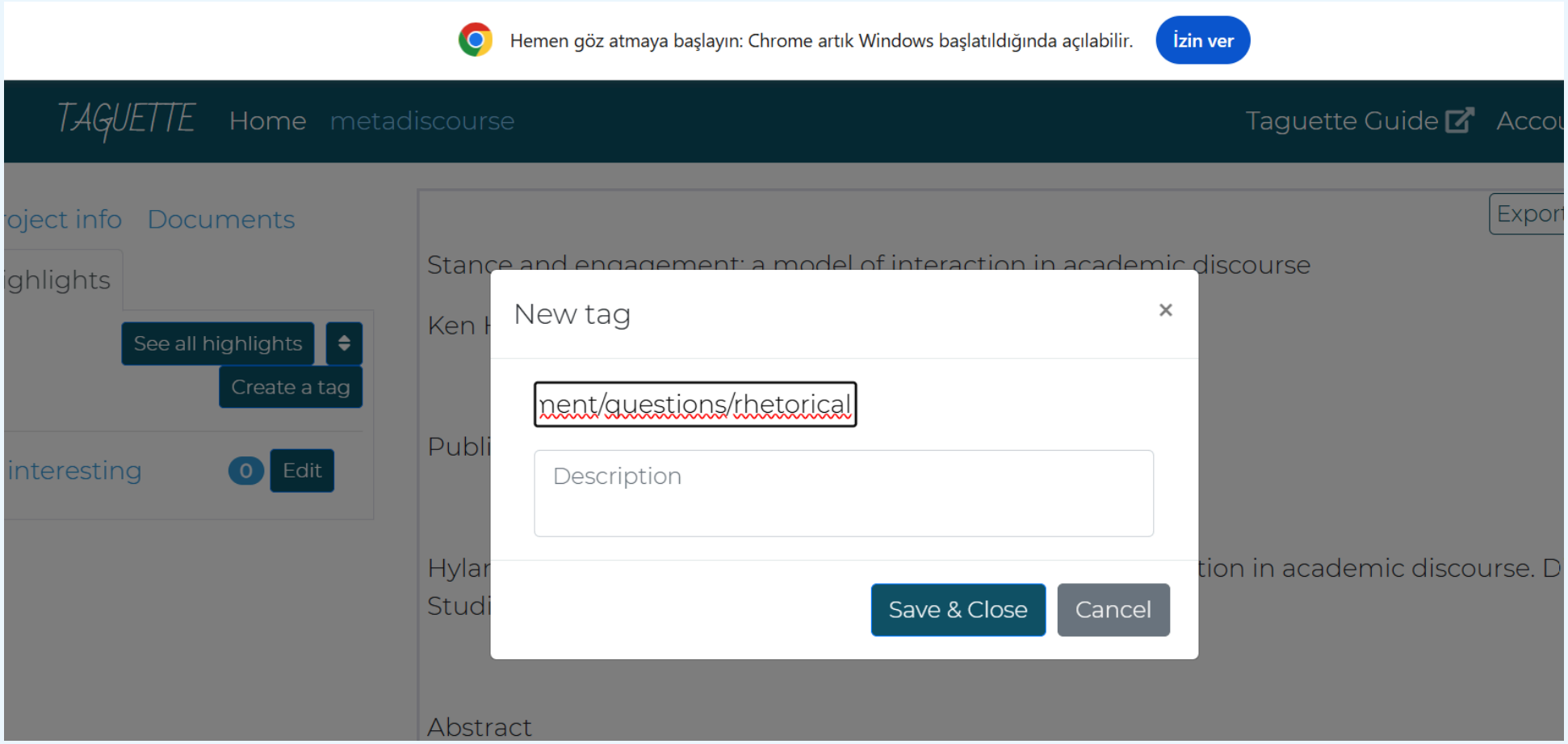
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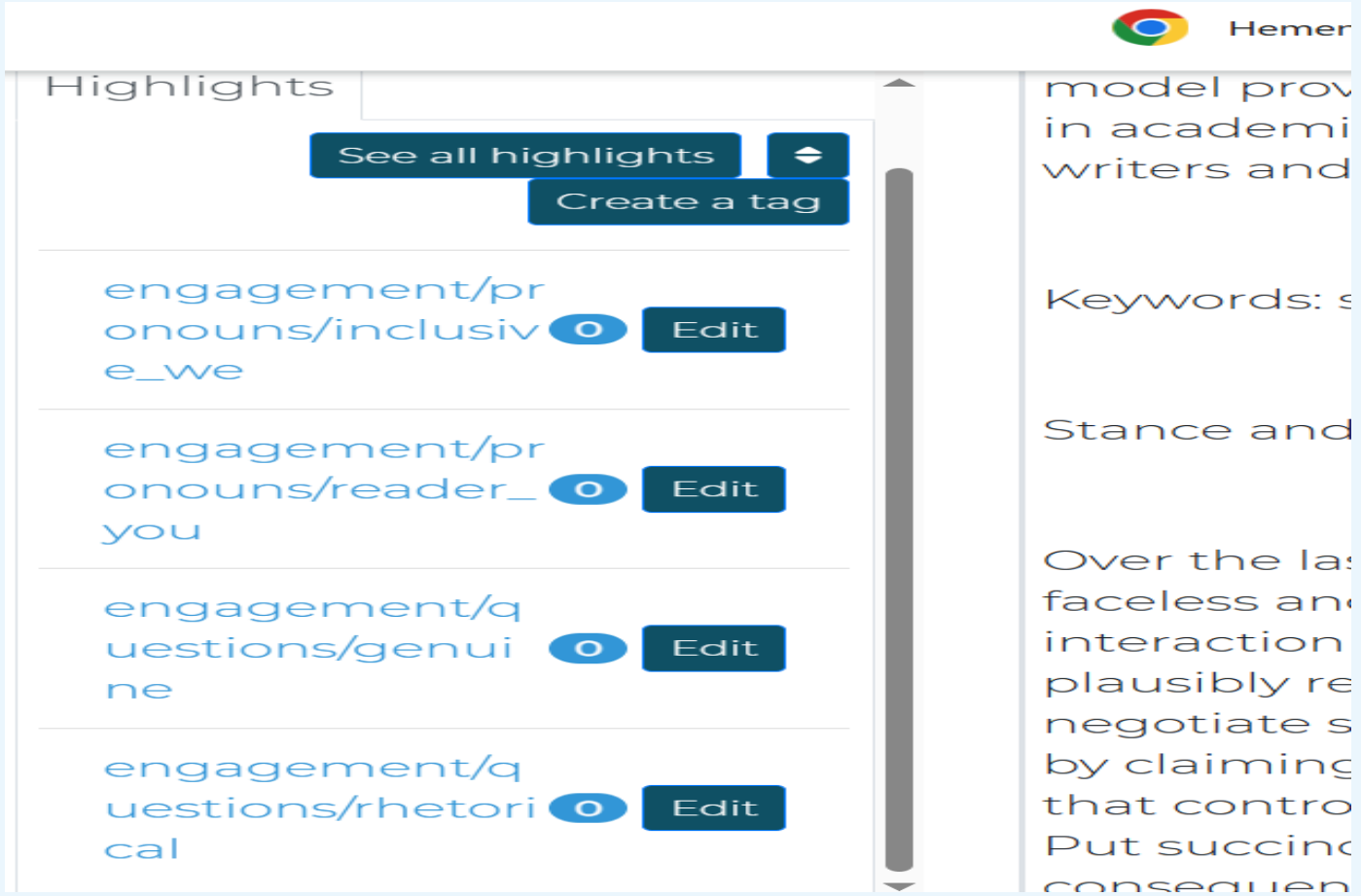
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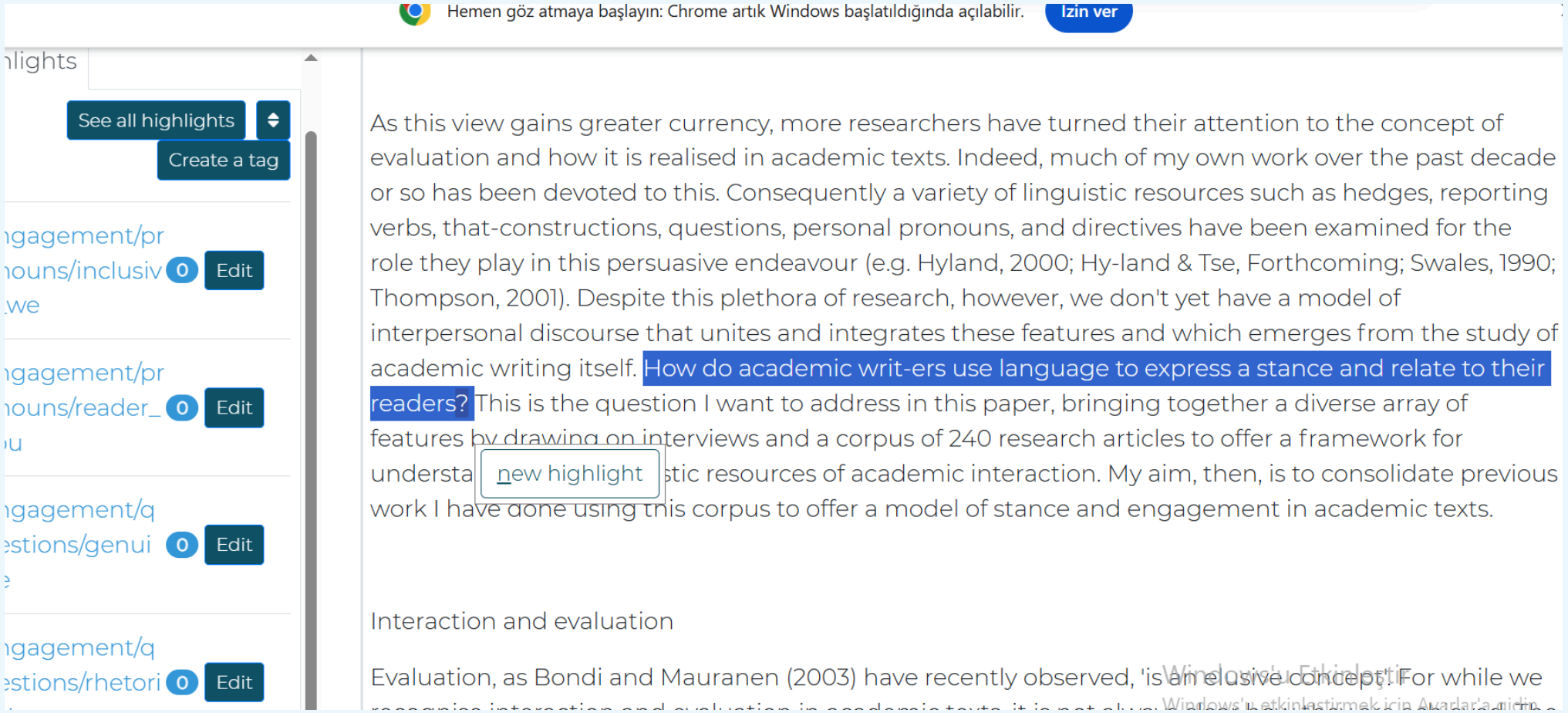
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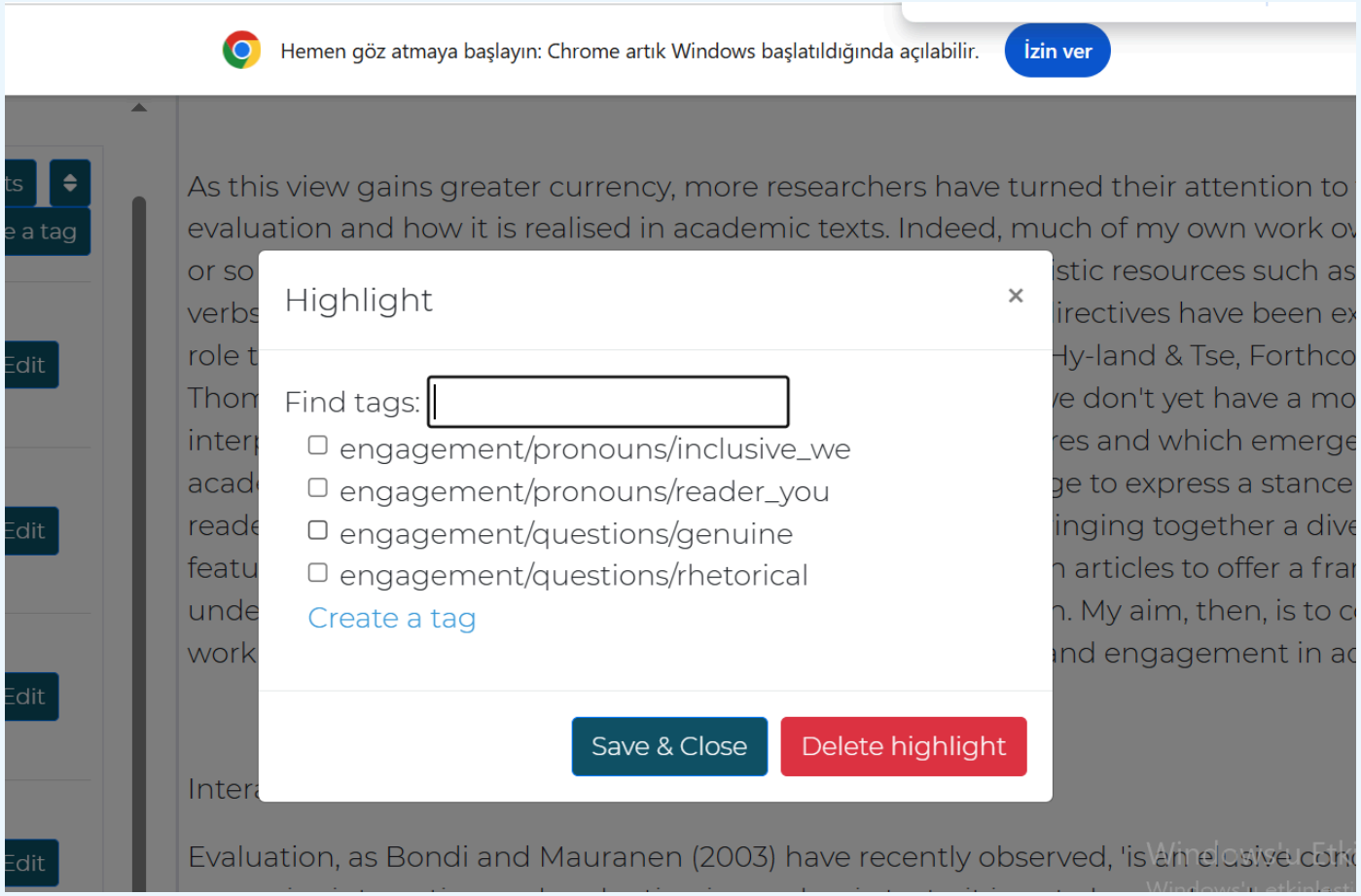
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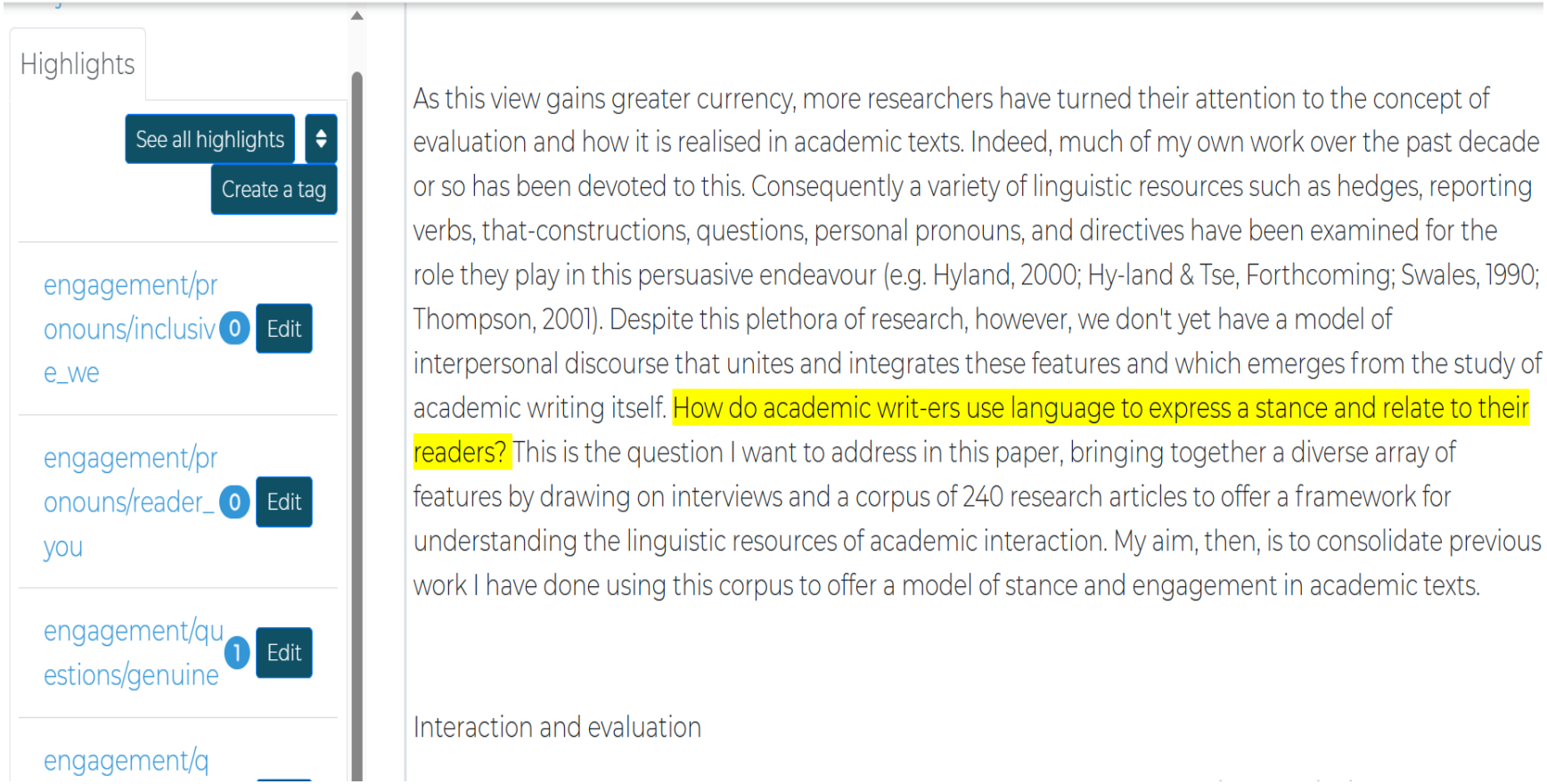


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Hemen göz atmaya başlayın: Chrome artık Windows başlatıldığında açılabilir. İzin ver



As this view gains greater currency, more researchers have turned their attention to the concept of evaluation and how it is realised in academic texts. Indeed, much of my own work over the past decade or so has been devoted to this. Consequently a variety of linguistic resources such as hedges, reporting verbs, that-constructions, questions, personal pronouns, and directives have been examined for the role they play in this persuasive endeavour (e.g. Hyland, 2000; Hy-land & Tse, Forthcoming; Swales, 1990; Thompson, 2001). Despite this plethora of research, however, we don't yet have a model of interpersonal discourse that unites and integrates these features and which emerges from the study of academic writing itself. How do academic writ-ers use language to express a stance and relate to their readers? This is the question I want to address in this paper, bringing together a diverse array of features by drawing on interviews and a corpus of 240 research articles to offer a framework for understanding the linguistic resources of academic interaction. My aim, then, is to consolidate previous work I have done using this corpus to offer a model of stance and engagement in academic texts.

Interaction and evaluation

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Key Takeaways

- ✓ Discourse analysis reveals how language constructs meaning in context.
- ✓ Linguistic features help us identify patterns.
- ✓ Taguette makes qualitative coding easier and more organized.
- ✓ AI can support, but not replace, critical thinking.
- ✓ The researcher’s interpretation remains central.

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Additional Note

Human expertise + AI assistance

The combination of human expertise and AI tools can enhance the efficiency and depth of qualitative discourse analysis while maintaining critical and ethical research practices.

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References

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Hyland, K. (2005). Stance and engagement: A model of interaction in academic discourse. Discourse Studies, 7(2), 173–192.

Taguette. (n.d.). Taguette — qualitative research tool. https://www.taguette.org/#

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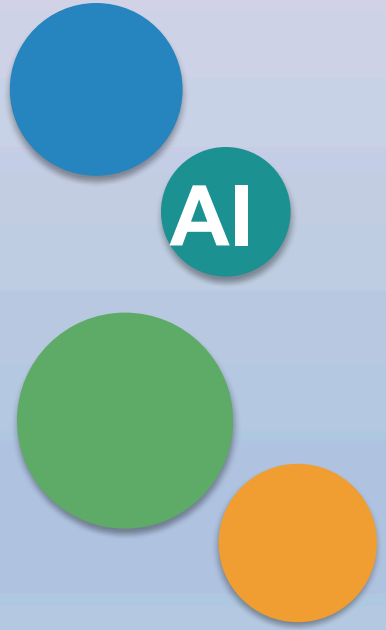
Better tools, deeper insights

Thank you for your attention!

Assoc. Dr. Fatma ARSLAN

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Voyant, Julius, Grammarly & Paperpal AI-Powered Tools for Academic Research and Writing



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Voyant Tools

- A free, web-based text analysis tool for computer-assisted text analysis.
- Examines word frequencies and visualizes patterns across texts.
- Widely used in discourse analysis and corpus linguistics studies.

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Voyant Tools: Core Features

- 1. Word Frequency: Shows how often specific words are used in your text (e.g., women, victim, murder in a femicide news corpus).
- 2. Word Cloud: Visually displays frequent words in a corpus; larger words indicate higher frequency (Note: word clouds alone do not prove ideology).
- 3. Contexts: Inspects sentences and surrounding words around a specific term to explore actors, actions, and discourses from a CDA perspective.

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Voyant Tools: Advanced Features

- 4. Trends: Graphically analyzes the distribution of a word across different parts or documents of a corpus (e.g., first vs. last 50 news articles).
- 5. Collocations: Examines words frequently appearing together (e.g., Woman + victim, Migration + crisis) to discover underlying relationships.

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Voyant Tools in Your Research

- Particularly useful for studies in English Language Teaching, Critical Pedagogy, and Discourse Analysis:
- • Femicide / GBV Media Analysis: Explore text patterns representing women, perpetrators, and violence.
- • Literature & Gender: Examine the usage of body, womanhood, violence, and resistance in literary texts like The Vegetarian.
- • Critical Discourse Analysis: Preliminarily examine recurring concepts and contextual usage in news, student writing, or political discourse.

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Voyant Tools: Important Academic Limitation

- Voyant Tools does NOT perform qualitative discourse analysis on its own.
- Word frequency and visualization help discover discursive patterns, but interpreting ideology, hegemony, power relations, or gender representations requires your theoretical framework and detailed text analysis.
- The tool is not designed to produce definitive and unquestionable interpretations.

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Julius AI

- An AI-powered data analysis tool for academic research, statistical testing, graph generation, and report preparation.
- Works with Excel, CSV, PDF, and various other file types.

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Julius AI: Core Capabilities

- 1. Statistical Analysis: Perform t-tests, ANOVA, correlation, descriptive statistics, and modeling using natural language commands.
- 2. Excel & Data Analysis: Clean data, group variables, generate charts, and discover data patterns from uploaded datasets.
- 3. Article & PDF Review: Summarize academic papers, query PDF contents, and synthesize information across multiple documents.
- 4. Graph & Report Preparation: Generate publication-ready charts, tables, and structured reports from analysis results.

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Julius AI: Example Applications

- • Translanguaging & Cultural Intelligence: Descriptive statistics, correlation, and factor analysis for scale data.
- • 7th Grade Vocabulary Study: Group comparisons, t-tests, and effect size checking.
- • FLCAS Study: Pre-test and post-test comparisons and graphs.
- • Survey Data: Frequency tables, visualization, and data cleaning.
- • Qualitative Texts: Support for text inspection and qualitative coding.

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Comparison: Julius AI vs. Voyant Tools

- Voyant Tools (Text Analysis):
- • Word frequency, Concordance & context, Word distribution, Corpus visualization
- Julius AI (Data & Statistics):
- • T-test and ANOVA, Data cleaning, Graphs and tables, Statistical modeling, PDF and article analysis

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Paperpal

- An AI-powered academic English writing, language editing, and publication preparation tool designed for academic researchers.

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Paperpal: Key Features

- 1. Academic Language Editing: Checks grammar, spelling, punctuation, word choice, and sentence structure to enhance clarity and fluency.
- 2. Paraphrasing & Academic Rewriting: Offers options to rephrase sentences, improve academic tone, and reduce word count.
- 3. Literature Discovery & Citation Support: Assists in discovering research papers and citing in various styles (always verify source validity).
- 4. Journal Submission Checks: Evaluates language, references, similarity, and technical requirements before submission.

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Paperpal: Primary Use Cases for You

- • Grammar Correction: Fixing English grammatical errors
- • Academic Wording: Suggestions for more academic and natural expressions
- • Paraphrasing: Rewriting while preserving meaning
- • Conciseness: Condensing overly long expressions
- • Journal Preparation: Pre-submission checks and refinements

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Paperpal in Action

- Original:
- "This study tries to investigate how translanguaging can be used by students in the classroom."
- Paperpal Academic Improvement:
- "This study investigates how students use translanguaging in the classroom."
- Result: Creates a more direct and academic expression while preserving meaning.

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Summary: AI Tools for Research & Writing

- • Paperpal: Academic English editing and journal submission preparation
- • ChatGPT: Writing, ideation, explanation, structuring, and research support
- • Julius AI: Data analysis, statistics, and visualization
- • Voyant Tools: Corpus and word pattern analysis

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Grammarly

- An AI-powered writing assistant used for English spelling and grammar checking, academic style enhancement, and text editing.

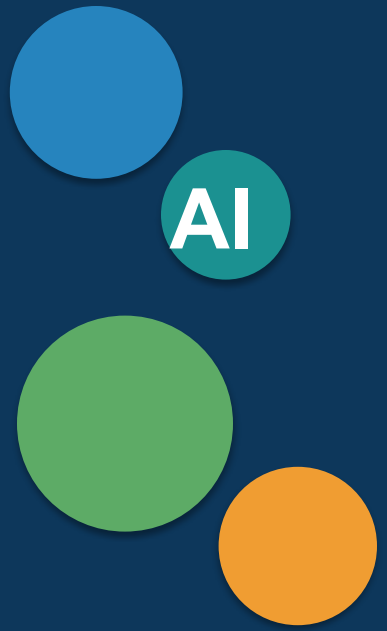
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Grammarly: Academic Applications

- 1. Article Proofreading: Provides suggestions on grammar, punctuation, and word usage while writing in Microsoft Word or web environments.
- 2. Academic Tone: The 'Academic' document setting provides suggestions on formal writing preferences and clarity.
- 3. Similarity & Citation Support: Select plans include plagiarism checking and citation support (always verify ethical compliance and source accuracy).

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Text Analysis with AI: Frequency Visualization & In-Text Relationship Mapping with Voyant Tools



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Presentation Agenda

01

Introduction

Foundational concepts of AI, text mining, and digital humanities.

02

Voyant Overview

Interface, data input options, and 29 analytical tools map.

03

Frequency Tools

Cirrus, Trends, Summary, and Bubblelines visualization methods.

04

Relationship Maps

Contexts, Links, Collocates, Correlation, Topics, and Scatter Plot.

05

Case Studies

Tourism, journalism, marketing, engineering, and literature.

06

Conclusion

Strengths, limitations, specific notes, and future outlook.

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SECTION 1 / 6

Introduction: AI and Text Mining Basics

Establishing the conceptual ground: what is artificial intelligence, how text mining works, and why we need computational tools.

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Artificial Intelligence vs. Traditional Approach

Traditional Approach

Manual reading: Line-by-line inspection by researchers.

Subjective coding: Qualitative categorization.

High subjectivity: Varying thematic interpretations.

Time-intensive: Weeks needed for large corpora.

AI & Computational Approach

Automatic frequency: Instant word counting.

Pattern discovery: Algorithmic co-occurrence mapping.

Sentiment scoring: NLP-driven polarity estimation.

Scalability: Thousands of documents processed instantly.

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What is Text Mining?

Statistical Extraction

Extracts linguistic patterns from digital text.

Input-Output Flow

Raw text yields instant frequency graphs.

Mixed Methods

Combines quantitative metrics with qualitative visuals.

Scale Independence

Scales from short bios to massive news archives.

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Digital Humanities & 'Distant Reading'

Franco Moretti's Concept: Focusing on units much smaller or much larger than the text to grasp deep patterns across vast corpora.

Voyant Tools was built by Stéfan Sinclair and Geoffrey Rockwell precisely to operationalize this distant reading philosophy.

> *"Distance is a condition of knowledge: it allows you to focus on units that are much smaller or larger than the text."*
>
> — Franco Moretti (2000)

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Why Big Data Approaches Matter

"Big data is simply data you cannot read yourself in a reasonable time." (Graham, Milligan & Weingart, 2015)

1,035

TripAdvisor tourism reviews analyzed in Guam study.

13,625

News headlines evaluated in global media corpus.

600+

Engineering paper titles mapped by librarians.

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SECTION 2 / 6

Voyant Tools Overview

Introducing the core software: web-based, free, open-source text analysis suite developed by Sinclair & Rockwell.

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Key Characteristics of Voyant Tools

Web-Based & Free

Accessible via voyant-tools.org without registration.

No Coding Required

Designed for both students and advanced researchers.

Multilingual Support

Native support for 13 languages globally.

Open-Source Stability

Actively maintained open-source codebase on GitHub.

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SECTION 3 / 6

Frequency Analysis Tools

Answering "what word appears how often?" using Cirrus, Trends, Summary, and Bubblelines.

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Cirrus (Word Cloud) & Its Limits

What Cirrus Does

Visualizes word frequency in a cloud layout where high-frequency terms appear largest and closest to the center.

Provides an immediate intuitive overview of dominant themes in a corpus.

Critical Limitations

Polysemy: Words can have multiple meanings missing from the visual.

No Context: Jacob Harris warns word clouds are like reading tea leaves without deeper context.

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Trends: Term Frequencies Over Time

Tracking Evolution: Plots line graphs of relative word frequencies across documents or chronological time slices.

X-Axis: Represents corpus documents (books, chapters, or years).

Y-Axis: Shows normalized relative frequencies for fair comparison.

Guam Tourism Study Insight

Analysis of 2017–2021 TripAdvisor reviews showed a sharp spike in 'water' and 'snorkeling' frequencies by 2021, revealing post-pandemic behavioral shifts.

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Summary: The Corpus Identity Card

Token Counts

Total documents, tokens, and unique word forms reported.

Vocabulary Density

Ratio of unique words to total words indicating lexical richness.

Sentence Length

Average words per sentence reflecting author style.

Readability Index

Estimates target audience educational level.

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SECTION 4 / 6

In-Text Relationship Maps

Moving from frequency to association: uncovering semantic networks with Contexts, Links, Collocates, Correlation, Topics, and Scatter Plot.

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Contexts (KWIC): Keyword in Context

Concordance Table: Displays every occurrence of a keyword alongside its left and right neighboring context.

Bridges quantitative metrics and qualitative reading by letting researchers inspect actual text snippets to resolve polysemy.

Resolving Apparent Contradictions

In the Guam study, both 'trash' and 'clean' appeared frequently; Contexts proved visitors praised water cleanliness while criticizing shore maintenance.

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Links & Collocates: Visualizing Associations

Links (Network Graph)

Displays force-directed dynamic graphs connecting high-frequency keywords with their co-occurring terms.

Collocates (Tabular View)

Presents the exact numerical table of co-occurrences, ideal for academic reporting and cross-validation.

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Correlation: Statistical Significance

Pearson Coefficient (r): Evaluates statistically significant positive and negative correlations between word pairs across segments.

p-value ≤ 0.05: Ensures relationships are not random.

Guam Insight: "family" strongly correlated with "bbq" (r=0.786).

Actionable Marketing Value

Statistical correlation proves that family-oriented tourism messaging around Ypao Beach should prominently feature barbecue and picnic amenities.

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Topics & Scatter Plot (Machine Learning)

Topics (LDA Modeling)

Uses Latent Dirichlet Allocation to automatically discover hidden thematic clusters within text corpora.

Scatter Plot (t-SNE)

Clusters multi-dimensional word spaces into intuitive 2D maps based on semantic proximity.

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SECTION 5 / 6

Case Studies: End-to-End Research

Examining six real-world academic studies applying Voyant tools across tourism, journalism, marketing, and literature.

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Case Studies 1 & 2: Tourism & Media

CASE 1 — SCHUMANN (2022)

Guam Tourism Perception

Analyzed 1,035 TripAdvisor reviews. Revealed strong links between family visitors and barbecue amenities, aiding destination management.

CASE 2 — AYDOĞAN ET AL. (2026)

AI & Journalism in Global Media

Evaluated 13,625 headlines via Media Cloud + Voyant + Python sentiment models. Shifted from ChatGPT anxiety (2023) to political ethics (2025).

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Case Studies 3 & 4: Marketing & Librarianship

CASE 3 — HETENYI ET AL. (2019)

Sales-Marketing Interface

Quantified qualitative survey responses from 124 employees using Cirrus, Correlation, Topics, and t-SNE scatter plots.

CASE 4 — HENDRIGAN (2019)

Engineering Librarianship

Mapped faculty research output across 600+ paper titles, revealing specific department foci beyond generic website tags.

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Case Studies 5 & 6: Literature & Stylometry

CASE 5 — YALÇINKAYA (2025)

Turkish Literary Analysis

Analyzed Ömer Seyfettin's short story "Kaşağı", tracking narrative crisis and conscience symbolism across sections using Trends.

CASE 6 — ULLAH & MAHMOOD (2019)

American Short Story Stylometry

Used Summary tool to compare five short stories, identifying universal dialogue patterns ("said") and author stylistic traits.

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SECTION 6 / 6

Conclusion & Evaluation

Strengths, limitations, specific notes for Turkish texts, and future outlook of text mining tools.

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Strengths & Methodological Limits

Core Strengths

Rapid Discovery: Uncovers hidden patterns in seconds.

Cross-Validation: Multi-tool verification chain.

Accessibility: Free and code-free interface.

Limitations

Not Definitive: Quantitative tools require qualitative validation.

Data Cleaning: Garbage in yields misleading visuals.

Context Blindness: Automated metrics miss irony or nuance.

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Future Outlook & Digital Humanities

AI Integration

Deeper synergy between statistical mining and LLM semantic analysis.

Multilingual Growth

Expanding robust lemmatization for agglutinative languages like Turkish.

Interdisciplinary Adoption

Wider adoption across social sciences, libraries, and corporate analytics.

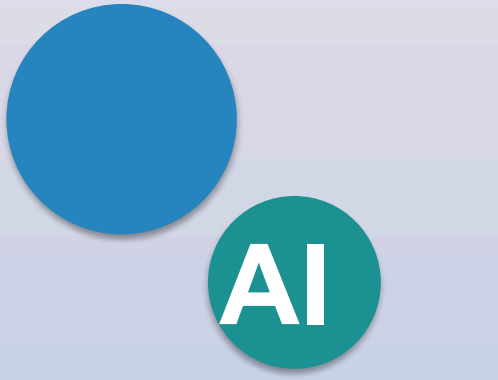
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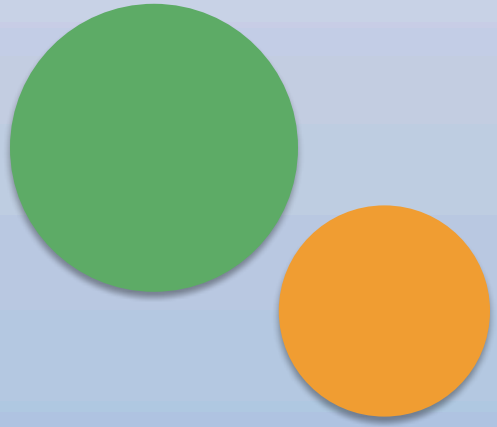
Thank You

Questions, comments, and discussion.

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AI, Findings Storytelling & Julius AI: Next-Gen Tools for Correlation & Charts





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Doç.Dr.FatmaARSLAN
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ROADMAP

Today's Discussion Plan

SECTION 01

Introduction

Basics of AI data analysis & concepts.

SECTION 02

Julius AI Overview

Core features & workflow steps.

SECTION 03

Frequency & Stats

Data cleaning & auto chart selection.

SECTION 04

Correlation & Tests

Hypothesis testing & error recovery.

SECTION 05

Case Studies & Ethics

Real scenarios & ethical dilemmas.

SECTION 06

Conclusion

Limitations & responsible usage.

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SECTION 1 / 6

Introduction: AI, Data Analysis & Findings Storytelling

Establishing the conceptual framework: What can generative AI achieve in data analysis, why does findings storytelling matter, and what are frequency and correlation?

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CORE CONCEPTS

What Can Generative AI Do in Data Analysis?

Method Recommendation

Suggests optimal statistical techniques.

Code Generation

Writes Python or R code automatically.

Output Interpretation

Explains numerical findings clearly.

Direct Execution

Completes end-to-end analysis seamlessly.

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EFFICIENCY SHIFT

Weeks of Analysis, Now in Hours

Traditional Workflow

Manual literature search & method selection.

Hand-written R, Python, or SPSS code.

Duration: Weeks or months.

AI-Assisted Workflow

Instant method recommendation via prompt.

Automated code execution and debugging.

Duration: Days or hours (UOW, 2026).

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CORE SKILL

Storytelling Findings: Why It Is a Unique Skill

Numbers Aren't Enough

Understanding statistical outputs requires distinct expertise.

Chat With Your Data

Julius AI provides contextual explanations for every output.

The Risky Shortcut

Copying outputs without understanding leads to serious errors.

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GLOBAL ADOPTION

500K+

Global users ranging from business analysts to academic researchers relying on Julius AI.

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SECTION 2 / 6

Julius AI: Overview & Architecture

Defining the core platform: How it works behind the scenes, model families, features, and target use cases.

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PLATFORM DEFINITION

What is Julius AI?

Chatbot for Data

AI-powered platform operating like a chat interface for datasets.

No Coding Required

Combines Python, Excel, and ChatGPT for automated stats.

Browser-Based

Zero software installation; instantly upload files and query.

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ARCHITECTURE

How Julius AI Works Behind the Scenes

1. Natural Language

Interprets user questions into queries.

2. Code Generation

Writes background Python/R code.

3. Secure Execution

Runs in isolated temporary containers.

4. Transparent Output

Returns visual and textual insights.

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SECTION 3 / 6

Frequency & Descriptive Statistics Visualization

Answering "What is in the data, how much, and how is it distributed?" through cleaning, auto chart selection, and time-series analysis.

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FIRST STEPS

Data Upload & Automatic Preview

Multi-Format Support

Upload Excel, CSV, PDF, or connect Google Sheets.

Smart Column Scanning

Automatically recognizes data types and semantics (e.g., BMI).

Suggested Prompts

Generates intelligent starting questions based on dataset structure.

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SECTION 4 / 6

Correlation, Hypothesis Testing & Chart Generation

Transitioning from descriptive metrics to relational depth: Pearson/Spearman tests, automated error recovery, and statistical interpretation.

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CORE ANALYSIS

Correlation Analysis with Julius AI

Appropriate Test Selection

Chooses Pearson or Spearman based on variable data types.

Significance Evaluation

Computes p-values to test statistical significance reliably.

Plain Language Summary

Summarizes findings in clear, thesis-ready narrative format.

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RELIABILITY

Self-Correction: How Julius Fixes Its Code

Runtime Exception Catching

Detects missing library errors (e.g., ModuleNotFoundError) instantly.

Autonomous Adaptation

Rewrites code blocks dynamically to achieve successful execution.

Superior Reliability

Prevents dead-end failures typical in standard chat tools.

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SECTION 5 / 6

Case Studies: Successes & Warnings

Real research scenarios exploring ethical dilemmas, over-reliance risks, TRIZ statistical modeling, and academic evaluations.

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CASE STUDY 1 · ETHICS

Sal & Social Media Data Dilemma

The Scenario

A PhD candidate collects social media posts regarding vaping.

Ethical Breach

Uploading user data without explicit consent or IRB approval.

AI Bias Risk

Assuming AI model outputs are completely neutral and unbiased.

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CASE STUDY 2 · OVER-RELIANCE

Ram & Over-Reliance on Julius AI

The Trap

Using AI to run statistical tests without understanding underlying methods.

Career Consequence

Failing a technical interview because of skill gaps during deep questioning.

Core Lesson

Tool proficiency must be paired with conceptual statistical competence.

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SECTION 6 / 6

Conclusion & Final Evaluation

Summary of limitations, security frameworks, responsible usage principles, and key takeaways for academic and professional researchers.

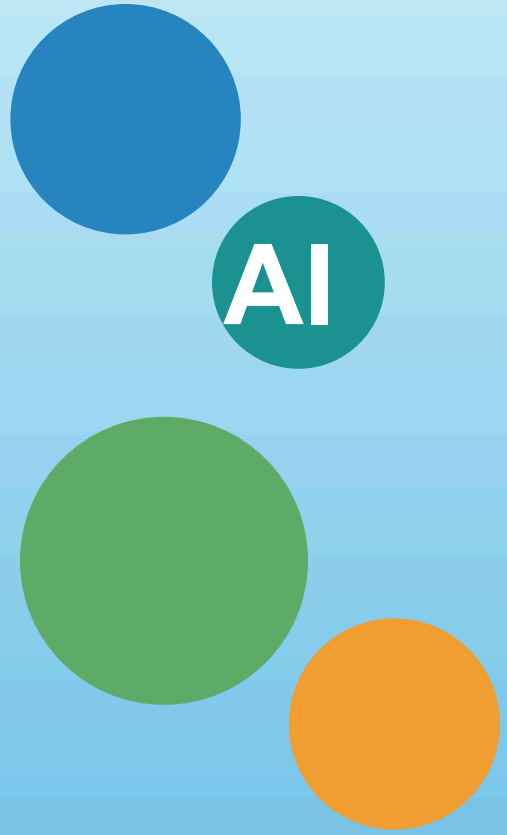
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Thank You!

Questions & Discussion

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AI Applications in Corpus Linguistics



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AI Applications in Corpus Linguistics

- Functional & Structural Classification of Lexical Bundles

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Core Concepts

- Corpus: A large, principled collection of authentic texts stored electronically (Our Dataset).
- Corpus Tools: Software programs (e.g., AntConc) that process massive amounts of linguistic data instantly.
- Lexical Bundles: Recurrent multi-word sequences (e.g., 'on the other hand', 'in the case of').

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Data Extraction (AntConc)

- Task: Extracting 4-word lexical bundles
- Target Tab: Clusters / N-Grams
- Key Settings:
- N-gram Size: 4
- Minimum Frequency: 20
- Range: 5 (Must appear in at least 5 different texts to avoid author bias)

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AI Prompt 1 (Setting the Framework)

- Strategy: Provide the theoretical rubric before analyzing data.
- Prompt: "Act as an expert corpus linguist. I am going to provide you with a functional taxonomy for lexical bundles based on Biber, Conrad, and Cortes (2004). I want you to learn this table and use it as your strict coding rubric for the next task. Do not analyze anything yet, just confirm that you understand the categories."

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The Functional Taxonomy (Biber et al., 2004)

- Category I: Stance Expressions
- - A. Epistemic stance
- - B. Attitudinal/modality stance
- Category II: Discourse Organizers
- - A. Topic introduction/focus
- - B. Topic elaboration/clarification
- Category III: Referential Expressions
- - A. Identification/focus
- - B. Imprecision
- - C. Specification of attributes
- - D. Time/place/text reference

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AI Prompt 2 (The Coding Task)

- Action: Feeding the raw data.
- Prompt: "Here is a list of the most frequent 4-word lexical bundles I extracted from an academic corpus using AntConc: [DATA]
- Please classify these bundles into the three main functional categories (Stance, Discourse Organizers, Referential) and their sub-categories using ONLY the theoretical framework I provided above. Present the results in a clear table."

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Interactive Critique

- Question: Is the AI always perfectly accurate in terms of pragmatics and co-text?
- Discussion Point: Does a bundle like 'on the other hand' always function strictly as a Discourse Organizer, or can context change its pragmatic function?

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AI Prompt 3 (Structural Shift)

- Action: Changing the theoretical framework live.
- Prompt: "Forget the functional taxonomy. Now, I want you to classify the exact same list of lexical bundles structurally. Use this Structural Taxonomy by Biber et al. (2004):
- 1. Verb phrase (VP) based bundles
- 2. Dependent clause based bundles
- 3. Noun phrase (NP) and Prepositional phrase (PP) based bundles
- Re-classify the list into a new table based on these structural rules."

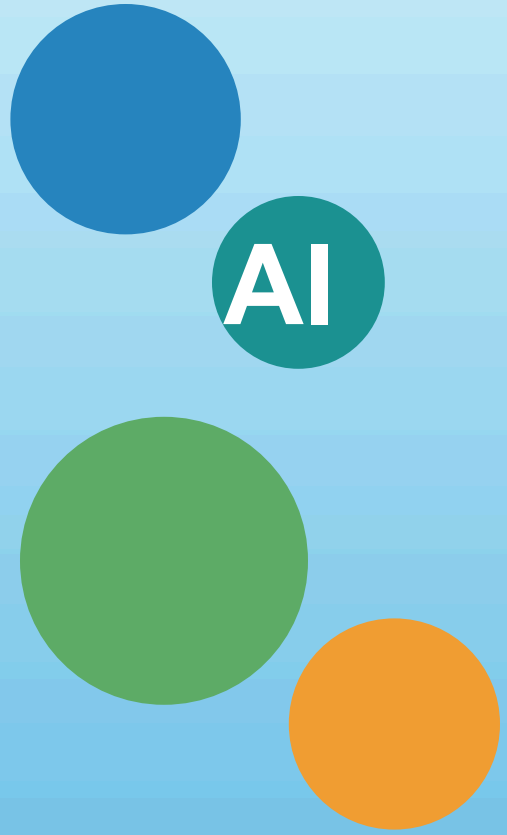
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Key Takeaways

- The Researcher = The Pilot | The AI = The Engine
- Step 1: Define your theoretical framework.
- Step 2: Provide the strict reference tables to the AI.
- Step 3: Always validate the output with human expertise.

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Drafting the Annotated Bibliography with NotebookLM



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Drafting the Annotated Bibliography with NotebookLM

- Synthesizing Literature with AI

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The Goal: From Citations to Annotations

- Requirement: An 'annotation' under each reference.
- Content: A ~150-word summary of the study's research question, methodology, and key findings.
- Preparation: Export the 15 PDF articles from Zotero to a local folder.

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Understanding NotebookLM & RAG

- Action: Upload the exported PDFs as Sources in NotebookLM.
- Technology: Retrieval-Augmented Generation (RAG).
- Why RAG?: The AI is strictly confined to the uploaded documents.
- Advantage: No internet searches, no invented studies (hallucinations). It is the safest tool for academic synthesis.

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AI Prompt (The Annotation Synthesis)

- Prompt: "Act as an expert academic writer. I have uploaded 15 research articles about translanguaging. I need you to write an 'annotated bibliography' entry for each article. For EACH of the 15 sources, write a single paragraph (approximately 150 words) that explicitly covers these three elements:
- 1. The primary research question or objective of the study.
- 2. The methodology used (including participant profile and context).
- 3. The most significant findings or conclusions.
- Format the output clearly, listing the title of the paper first, followed by its annotation."

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Verifying AI Accuracy

- Feature: NotebookLM generates citation numbers at the end of sentences.
- Action: Click the citation number to open the original PDF.
- Result: The exact sentence used to write the summary is highlighted for instant verification.

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Final Assembly & Human Agency

- Action: Paste the AI-generated summaries under the Zotero APA citations in Word.
- Core Principle: Human Agency! The AI output is only a draft.
- Researcher's Job: Read the annotations, verify context via citation links, and edit the language to reflect your academic voice.

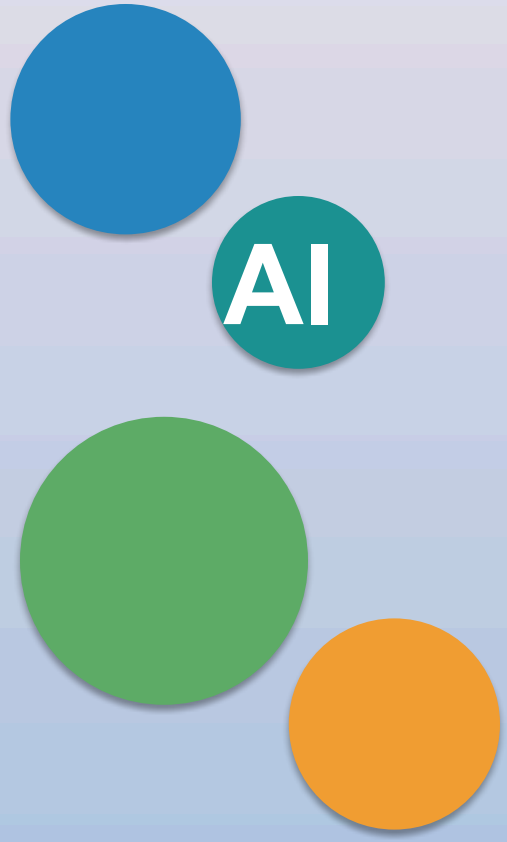
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Participant Task

- Step 1: Export your gathered PDFs from Zotero.
- Step 2: Upload them as sources into your NotebookLM project.
- Step 3: Run the annotation prompt.
- Step 4: Verify the citations and assemble your draft in Word.

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From Literature Review to an Original Conclusion



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Learning Objectives

Move from summary to critical synthesis

Identify patterns, gaps, contradictions and trends

Use Google Gemini to support critical analysis of reviewed studies

Develop an original interpretation of the literature

Write a concise Conclusion and meaningful Future Research directions

KEY PRINCIPLE

AI can support your thinking, but it cannot replace your scholarly judgment.

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Summary vs. Synthesis vs. Critical Evaluation

SUMMARY

What did Study A find?

What did Study B find?

What method did they use?

What were their results?

SYNTHESIS & EVALUATION

What do several studies show together?

Where do studies agree or disagree?

What are the limitations?

What remains unclear?

MOVE BEYOND

"Study A found X. Study B found Y." → "Taken together, these studies suggest…"

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From Description to Critical Synthesis

ASK ABOUT THE LITERATURE

PATTERNS — What findings recur?

CONTRADICTIONS — Where do findings differ?

GAPS — What has not been sufficiently investigated?

IMPLICATIONS — What do the findings mean?

ACADEMIC SYNTHESIS

Connect studies rather than list them

Compare evidence and contexts

Explain relationships among findings

Develop an interpretation

FORMULA

Patterns + Contradictions + Gaps + Implications

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Example: Turning Studies into a Synthesis

DESCRIPTIVE WRITING

Smith (2023) found that AI tools helped students improve academic writing.

Jones (2024) reported that students used AI mainly for proofreading.

Brown (2025) found concerns about AI-generated content.

POSSIBLE SYNTHESIS

Taken together, these studies suggest that AI tools are increasingly integrated into academic writing, particularly for language-related support.

However, their use also raises concerns about authorship, critical engagement and responsible academic practice.

NOTICE

Three studies → one interpretation

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Developing Your Own Interpretation

What does the literature collectively tell us?

What is well established?

What remains uncertain or contested?

What important questions are still unanswered?

Why does this matter for the field?

USEFUL LANGUAGE

"Taken together…" • "A recurring pattern…" • "However…" • "An important gap…" • "This suggests a need…"

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Using Google Gemini Critically

GEMINI CAN HELP YOU

Compare studies

Identify recurring themes

Detect contradictions

Identify methodological differences

Suggest possible research gaps

Generate questions for further investigation

BUT REMEMBER

Gemini's response is not evidence

Verify claims against original sources

Check every citation

Evaluate whether the interpretation is justified

Keep your own scholarly judgment

CRITICAL AI LITERACY

Check → Verify → Evaluate → Decide

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A Critical Gemini Prompt

Citation: Biber, D., Conrad, S., & Cortes, V. (2004). If you look at...: Lexical bundles in university teaching and textbooks. *Applied Linguistics*, 25(3), 371–405. **Summary: This study investigates the use of frequent multi-word sequences, known as "lexical bundles," across two primary university registers: classroom teaching and textbooks. Adopting a frequency-driven corpus approach, the authors compare these registers against conversation and academic prose. Their analysis highlights that lexical bundles serve as structural and functional building blocks of discourse rather than complete grammatical units or idioms.**	**Citation: Hyland, K. (2008). As can be seen: Lexical bundles in university student and professional writing. *English for Specific Purposes*, 27(1), 41–59.** **Summary: Focusing on the role of 4-word bundles in English for Academic Purposes (EAP), Hyland explores how extended collocations contribute to textual coherence and meaning-making. The research is based on a 3.5-million-word corpus spanning research articles, doctoral dissertations, and Master's theses across four distinct academic disciplines to uncover disciplinary variations in bundle frequency and form.**
Citation: Biber, D. (1993). Representativeness in corpus design. *Literary and Linguistic Computing*, 8(4), 243–257. **Summary:** This foundational methodological paper argues that register variation is an inherent and systematic property of natural language. Biber demonstrates that individual grammatical and lexical features vary widely across registers, which has direct implications for natural language processing tools like part-of-speech taggers and syntactic parsers. It advocates for diversified corpora as an absolute prerequisite for accurate general language studies and computational applications.	**Citation:** Biber, D., Davies, M., Jones, J. K., & Tracy-Ventura, N. (2006). Spanish corpus linguistics and multi-dimensional analysis. *International Journal of Corpus Linguistics*, 11(2), 205–230. **Summary:** Addressing the historical dominance of English-centric corpus research, this study applies Multi-Dimensional (MD) analysis to Spanish. Using a 20-million-word corpus covering 19 spoken and written registers and tracking 146 linguistic features, the authors examine how register variation operates in a major Romance language with a rich literary history.

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A Critical Gemini Prompt

I am writing a literature review on lexical bundles. Below I provide summaries of 4 studies. Do not write my conclusion. Instead, compare the studies and identify: (1) recurring findings, (2) contradictory findings, (3) methodological differences, (4) under-researched areas, and (5) possible implications. For each point, indicate which study/studies support the observation. Do not invent information that is not present in the summaries.

WHY THIS WORKS

The prompt asks AI to analyse relationships among studies rather than simply generate prose.

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A Critical Gemini Prompt

Recurring Findings: Register variation is inherent and systematic in language: Biber (1993) argues that register variation is inherent and systematic in natural language. This is supported by Biber et al. (2004), who demonstrate that different university registers (classroom teaching and textbooks) feature unique distributions and functions of lexical bundles compared to conversation and academic prose. Furthermore, Biber et al. (2006) show that register variation operates across a wide range of spoken and written registers in Spanish, identifying six primary dimensions of variation.

The significance of multi-word sequences/bundles across text types: Both Biber et al. (2004) and Hyland (2008) emphasize that lexical bundles/chunks are critical structural and functional building blocks of discourse that help shape meanings and textual coherence.

WHY THIS WORKS

The prompt asks AI to analyse relationships among studies rather than simply generate prose.

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A Critical Gemini Prompt

Methodological Differences: Frequency-Driven vs. Multi-Dimensional (MD) Approaches: Biber et al. (2004) adopt a frequency-driven approach to identify multi-word sequences (lexical bundles) and analyze their structural patterns and functional taxonomies. In contrast, Biber (1993) and Biber et al. (2006) utilize Multi-Dimensional (MD) analysis to investigate the distribution of a large set of linguistic features (e.g., 146 linguistic features across a 20-million-word Spanish corpus) to uncover underlying functional dimensions of variation.

Corpus Scope and Focus: Biber et al. (2004) focus specifically on university registers (classroom teaching and textbooks). Hyland (2008) focuses on 4-word bundles in a 3.5-million-word corpus of research articles, dissertations, and theses across four distinct disciplines.Biber (1993) deals with register-diversified corpora to evaluate individual grammatical/lexical features and probabilistic computational tools.Biber et al. (2006) expand corpus methodologies to a non-English language (Spanish), analyzing 19 spoken and written registers.

WHY THIS WORKS

The prompt asks AI to analyse relationships among studies rather than simply generate prose.

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A Critical Gemini Prompt

Under-Researched Areas:
Disciplinary variations in EAP bundles: Hyland (2008) notes that "the extent to which they [bundles] differ by discipline remains an open question," indicating a need to further learn about disciplinary variations in frequencies and preferred uses.
Comprehensive register analyses in languages other than English: Biber et al. (2006) point out that "there have been few comprehensive analyses of register variation conducted in a European language other than English," highlighting a gap in cross-linguistic corpus research outside of English.

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A Critical Gemini Prompt

Possible Implications

Impact on Computational Linguistics and NLP tools: Biber (1993) notes that cross-register differences are critical for probabilistic part-of-speech taggers and syntactic parsers because probabilities of grammatically ambiguous forms vary across registers, meaning such analyses can be applied to the automatic classification of texts into register categories.

Implications for Academic Literacy and EAP: Hyland (2008) implies that because bundles differentiate written texts by discipline, understanding these patterns is central to mastering academic discourse and writing across specific fields.

Theoretical Status of Lexical Bundles: Biber et al. (2004) state that their analysis has broader implications for understanding the theoretical status of lexical bundles as unique constructs that act as discourse building blocks rather than complete grammatical structures or idioms.

Cross-Linguistic Universals vs. Specialization: Biber et al. (2006) imply that comparing Romance languages like Spanish to English helps isolate specialized dimensions (such as counterfactual focus) versus universal functional considerations like interactiveness and informational density.

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AI Output ≠ Final Academic Argument

Is this really a gap? → Check the original studies.

Is this interpretation justified? → Compare the evidence.

Did Gemini invent a claim or citation? → Verify against the source.

Does this reflect my understanding? → Use your own scholarly judgment.

CORE IDEA

AI can suggest an interpretation. You decide whether it is academically defensible.

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Writing the Conclusion

A FOUR-STEP STRUCTURE

1. RECAP — What does the literature generally show?
2. SYNTHESIZE — What patterns and relationships emerge?
3. IDENTIFY THE GAP — What remains unresolved?
4. IMPLICATION — What should happen next?

SIMPLE LOGIC

Overall finding

↓

Critical synthesis

↓

Research gap

↓

Implication

GOAL

The conclusion should demonstrate what YOU have learned from the literature.

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A Critical Gemini Prompt

Recap & Synthesize: The literature generally shows that register variation is an inherent and systematic property of natural language, and that lexical bundles serve as critical building blocks of discourse across texts. Patterns emerge demonstrating that these multi-word sequences function differently across spoken, written, academic, and disciplinary contexts.

Identify the Gap: Despite significant findings regarding bundle frequencies and functional taxonomies, the extent to which lexical bundles differ by discipline remains an open question. Furthermore, there have been few comprehensive analyses of register variation conducted in European languages other than English.

Implication:

Future research should expand on cross-linguistic register comparisons and detailed disciplinary analyses using diversified corpora. Doing so will not only fill current empirical gaps but also enhance computational linguistic tools—such as automatic text classification and syntactic parsers—by properly accounting for cross-register and cross-linguistic variations.

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Conclusion: Useful Academic Language

OPENING & SYNTHESIS

“Overall, the reviewed literature indicates that…”

“Taken together, the findings suggest…”

“The literature reviewed in this study demonstrates…”

“Nevertheless, the evidence remains mixed regarding…”

GAPS & IMPLICATIONS

“An important gap concerns…”

“Relatively little attention has been paid to…”

“Further research is needed to examine…”

“This suggests that future research should…”

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Future Research Recommendations

Avoid: “More research is needed.”

WHAT? — What should be investigated?

WHO? — Which population?

WHERE? — Which context?

HOW? — Which methodology?

WHY? — Why is the research necessary?

EXAMPLE

Future research could investigate how postgraduate students evaluate AI-generated academic information through longitudinal studies involving students from different disciplinary contexts.

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Mini Workshop: From Studies to Synthesis

STEP 1 — Select 3–5 studies from your annotated bibliographies.

STEP 2 — Identify: one recurring pattern, one difference/contradiction, one research gap, and one implication.

STEP 3 — Write ONE synthesis statement.

5-MINUTE TASK

“Taken together, these studies suggest that _____; however, _____. This indicates a need for _____.”

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Exit Task: Draft Your Conclusion

Write 100–150 words.

Include the overall finding.

Include at least one synthesis of previous studies.

Identify one research gap.

State one implication or future direction.

SELF-CHECK

Is this my interpretation of the literature, or simply a summary of what the studies said?

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From Draft to Polished Literature Review

Academic Language Editing, AI-Supported Feedback and Critical Revision

SESSION 2 • 35-MINUTE ONLINE WORKSHOP | TÜBİTAK 2237-A Scientific Educational Activities Support Programme

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Learning Objectives

Revise academic language using Grammarly or Paperpal

Improve clarity, cohesion and academic style

Check references and citation–claim correspondence

Use Stanford AI Reviewer for AI-supported feedback

Critically evaluate AI-generated feedback before revising

Prepare a 2,000+ word literature review plan and final submission

KEY PRINCIPLE

AI feedback is input for revision—not an instruction that must be followed.

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Three Levels of Revision

LEVEL 1 — LANGUAGE

Grammar

Punctuation

Sentence structure

Academic vocabulary

Conciseness

LEVEL 2 & 3 — TEXT + ARGUMENT

Clarity and cohesion

Paragraph organization

Evidence

Synthesis

Interpretation

Logic and originality

REMEMBER

A grammatically correct text is not necessarily a strong academic text.

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Grammarly / Paperpal: What Can They Help With?

LANGUAGE

Grammar

Punctuation

Sentence structure

Academic vocabulary

Conciseness

STYLE

Formality

Clarity

Readability

Word choice

Repetition

CRITICAL USE

Do not accept every suggested change automatically.

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Example: Academic Revision

ORIGINAL

Many researchers have made studies about AI and academic writing and they found different things, so this topic is very important and more research should be done.

POSSIBLE REVISION

Previous studies have examined the use of AI in academic writing and have reported varied findings.

These differences highlight the need for further research examining how AI-mediated writing practices influence academic development across different contexts.

ASK

What changed? Vocabulary • sentence structure • cohesion • precision • academic tone

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Preserve Your Academic Voice

Does the suggestion preserve my intended meaning?

Does it accurately represent my evidence?

Does it reflect my disciplinary context?

Does it change the strength of my claim?

Does it sound like something I would actually argue?

PRINCIPLE

Editing is not rewriting your research for you.

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Reference and Citation Check

Check the author, year, title, journal/publisher, and DOI or URL.

Check whether the cited source actually supports the statement.

Compare the citation with the original publication.

Never rely on an AI-generated reference without checking the original source.

VERIFICATION QUESTION

Does the cited source actually support the claim I have made?

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Stanford AI Reviewer (https://paperreview.ai/) : AI-Supported Peer Feedback

USE FEEDBACK TO EXAMINE

Clarity

Organization

Argumentation

Evidence

Coherence

Academic style

Possible weaknesses

THINK OF AI AS

A reviewer

NOT an author

A source of questions

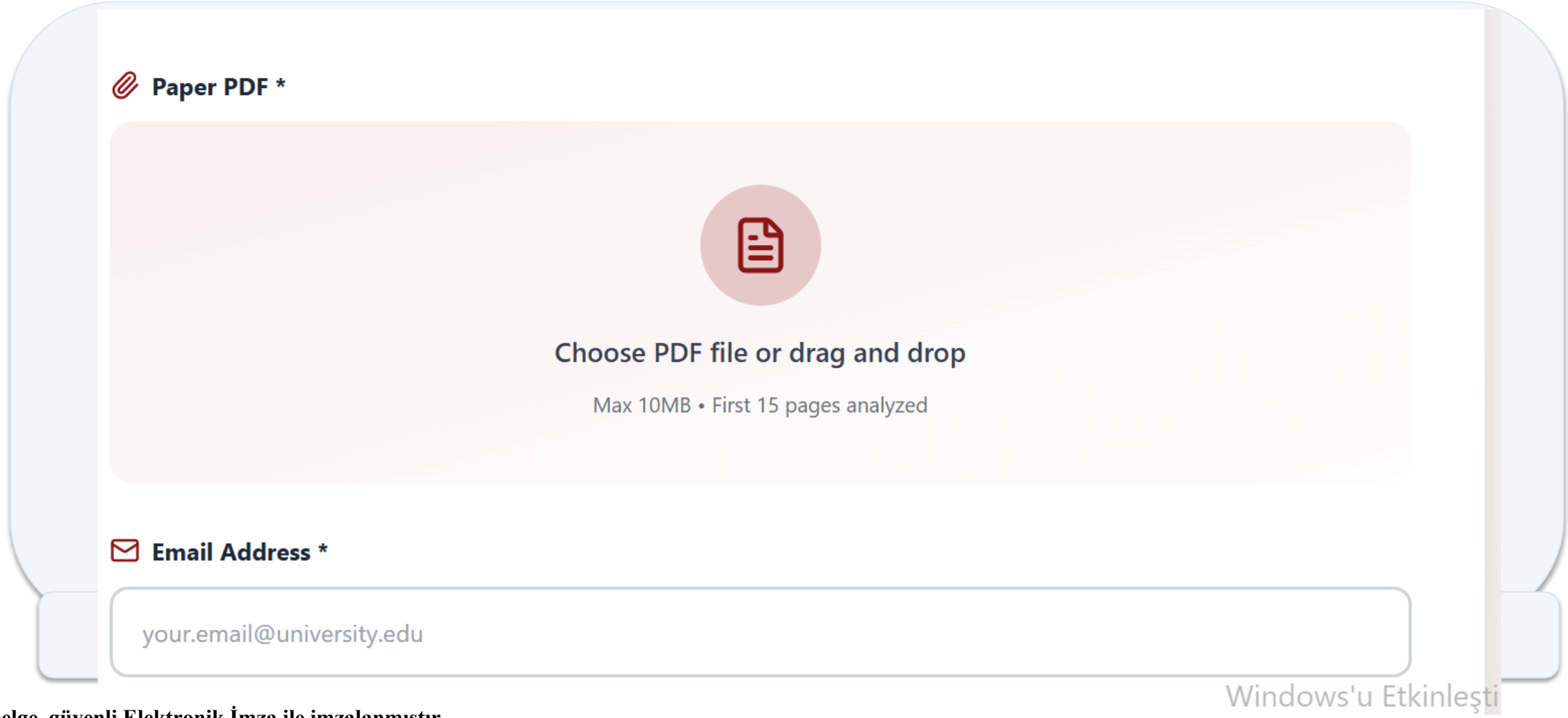
NOT the final decision-maker

HUMAN ROLE

The researcher evaluates the feedback and decides what to revise.

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Windows'u Etkinleşti

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The AI Feedback Cycle

1. RECEIVE — Read the AI feedback.
2. EVALUATE — Is the feedback relevant and accurate?
3. DECIDE — Do I agree with the recommendation?
4. REVISE — Modify the text if appropriate.
5. VERIFY — Check the revised claim against the original evidence.

CYCLE

Feedback → Evaluation → Revision → Verification

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Do Not Accept AI Feedback Blindly

AI REVIEWER SAYS

“This paragraph needs more evidence.”

YOUR QUESTIONS

Does the paragraph actually make a claim?

Is evidence already provided?

Is the problem lack of evidence or unclear reasoning?

Would another source genuinely strengthen the argument?

CRITICAL AI LITERACY

Evaluate the feedback before acting on it.

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Before & After Revision

BEFORE

AI is useful for students because many studies show that students use AI for writing. AI also has some problems. Therefore, researchers should study AI more.

AFTER

The reviewed literature indicates that AI tools can support several aspects of academic writing, particularly language-related tasks and feedback.

However, the literature also raises concerns regarding authorship, source verification and students' critical engagement with AI-generated content.

WHAT IMPROVED?

Synthesis + precision + criticality + implication

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Your 2,000+ Word Literature Review Plan

SUGGESTED STRUCTURE

1. Introduction — 200–300 words
2. Thematic Literature Review — 1,200–1,400 words
3. Research Gap — 200–300 words
4. Conclusion & Future Research — 200–300 words

INCLUDE

Clear topic and scope

Thematic synthesis

Critical evaluation

Evidence-based claims

Research gap

Original interpretation

References

TARGET

2,000+ words

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Final Quality Checklist

CONTENT & ORGANIZATION

- ☐ Clear focus and scope
- ☐ Relevant studies
- ☐ Evidence-based claims
- ☐ Critical synthesis
- ☐ Research gap
- ☐ Original interpretation
- ☐ Logical structure
- ☐ Strong conclusion

LANGUAGE, REFERENCES & AI

- ☐ Academic tone
- ☐ Grammar checked
- ☐ Precise vocabulary
- ☐ APA 7 style
- ☐ In-text citations checked
- ☐ References verified
- ☐ AI claims checked
- ☐ Human judgment maintained

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Final Submission

Prepare your 2,000+ word literature review plan/draft.

Include: Introduction, thematic synthesis, critical evaluation, research gap, Conclusion, Future Research, and References.

Review language with Grammarly or Paperpal where appropriate.

Use Stanford AI Reviewer for feedback and critically evaluate the suggestions.

Complete your final revision before uploading.

FINAL PRODUCT

Your research + your interpretation + your scholarly judgment

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Google Docs Submission

1. Check the final file.
2. Check citations and references.
3. Review AI-generated suggestions.
4. Make your final revisions.
5. Upload the final version to the Google Drive space provided by the project coordinator.

FINAL CHECK

The submitted text should represent your own scholarly interpretation.

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Final Reflection

AI CAN

Suggest

Compare

Identify

Question

Provide feedback

Support revision

THE RESEARCHER MUST

Interpret

Verify

Evaluate

Decide

Take responsibility

Maintain academic voice

FINAL MESSAGE

Responsible AI use does not mean using less AI. It means using AI with more critical judgment.

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