Enhancing Academic Research Skills with AI

Undergraduate and Graduate Students

Example Lesson Plan for an In-Person Instructor Led Course

Created using Canva Magic Write, Canva AI, and Copilot

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How to Use This Lesson Guide

This guide supports instructors in delivering the *AI-Enhanced Academic Research Skills* course effectively and engagingly in an in-person, instructor-led format. It is designed to help instructors effectively deliver the *AI-Enhanced Academic Research Skills* lesson by providing step-by-step instructions, facilitation tips, and evaluation tools. It supports instructors in creating an engaging, practical learning experience where students explore real-world applications of AI in academic research.

Through a mix of discussion, demonstration, hands-on activities, and reflective group presentations, instructors will guide students in:

- Understanding the role of AI in the research process
- Practicing with commonly used AI tools (e.g., Google Scholar, Mendeley)
- Critically evaluating the benefits and limitations of these technologies

The guide includes detailed timing, prompts, materials needed, activity instructions, and assessment rubrics to ensure a smooth and consistent delivery of the session. Whether you're new to teaching with AI or looking to enrich your existing curriculum, this guide equips you to lead confidently and adapt the session to fit your learners' needs.

Getting Started

1. **Familiarize Yourself with the Lesson Structure**
   Review lesson activities and content to understand the instructional flow—from introducing AI concepts to evaluating AI's ethical and methodological implications.
2. **Review All Resources**
   Ensure access to suggested articles, YouTube videos, and AI tools such as Google Scholar, EndNote, Mendeley, and Elicit. Confirm licensing for in-course use (materials are Creative Commons–licensed or open-access).
3. **Set Up the Classroom**
   Verify any technology required for the lesson is accessible and set up. Confirm videos are permitted. Ensure all handout materials are printed, and you have enough for all learners.

Lesson Framework and Teaching Notes

The activities in this course aim to empower learners with the necessary knowledge and skills to effectively integrate AI into their research practices, fostering innovation and critical thinking in academic endeavors.

15 min – Introduction

- **Slide**: Introduction to AI in Academic Research
- **Discussion Prompt**: "How do your current research processes compare to those enhanced by AI?"

- **Instructor Tip**: Encourage all voices, especially students with prior AI tool experience. Keep the discussion focused by listing responses on a whiteboard.

30 min – AI Tools Demonstration

- **Slide**: Examples of AI Tools
- **Live Demos**:
  - Show a search on Google Scholar and explain AI-based ranking
  - Use Mendeley or EndNote to generate citations
- **Instructor Tip**: Ask students to follow along or try a quick task like saving a citation to a library.

30 min – Hands-On Group Activity

- **Task**: In groups, use AI tools to build an annotated bibliography for a sample topic
- **Instructor Role**: Facilitate, offer suggestions, and troubleshoot
- **Output**: Each group presents their bibliography and reflects on their experience with AI tools

20 min – Critical Assessment & Discussion

- **Slide**: Benefits and Limitations of AI
- **Discussion Prompt**: "What worked well and what didn't?"
- **Instructor Tip**: Use the provided pros/cons table to frame the discussion and draw out critical thinking

15 min – Closing & Reflection

- **Prompt**: "How might AI shape your future research?"
- **Follow-Up**: Assign a short reflection paper
- **Instructor Tip**: Leave a few minutes for Q&A and share extra resources or tutorials

Tip: Encourage students to reflect on how tools or insights could be applied to their own research.

Instructional Tips

- **Foster inclusivity:** Not all learners may be familiar with AI, so explain terms clearly and avoid jargon.
- **Balance optimism with critique:** While AI is exciting, emphasize ethical and critical engagement.
- **Be adaptive**: If students are more advanced, include optional tasks like testing AI writing assistants or exploring Semantic Scholar/Elicit.

Assessment Criteria

- **Participation:** Quality of engagement during group work and discussions
- **Annotated Bibliography:** Relevance, structure, and use of AI tools
- **Reflection Paper:** Thoughtful insights on AI's role in personal research practice

Lesson Overview

Learners will explore various AI tools, develop practical skills, and critically assess the benefits and challenges of AI in research. The lessons also emphasize ethical considerations and future trends, preparing students to navigate and contribute to the evolving landscape of academic research.

- **Format**: In-person, instructor-led training session
- **Audience**: University students or early-career researchers

Lesson Objectives

By the end of this course, students will be able to:

1. Understand the role of artificial intelligence (AI) in academic research.
2. Identify various AI tools and platforms that can enhance research capabilities.
3. Develop skills to utilize AI tools for data collection and analysis effectively.
4. Critically assess the advantages and limitations of using AI in research.
5. Collaborate using AI tools to enhance academic research projects.

Visuals Needed

- A Diagram showing the integration of AI in research stages: literature review, data collection, data analysis, and reporting.
- A table comparing the pros and cons of AI-enhanced research.
- Screenshots of interfaces from tools like Google Scholar, EndNote, and Mendeley.
- Benefits and Limitations of AI in Research

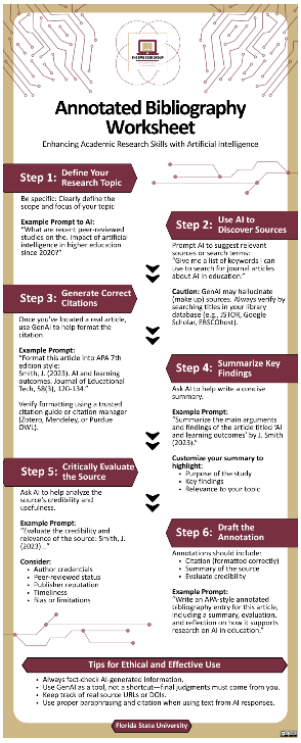
Lesson Materials

Materials Needed:

- Projector and screen for visual presentations
- Integrating AI into Academic Research - Course Intro Presentation
- Computers or tablets with internet access (in-person)
- Access to AI tools such as Google Scholar, EndNote, and Mendeley
- Printed handouts: Infographic Job Aid and Activity Worksheet

Supplemental Materials Included

The list below comprises supplementary materials provided for this lesson plan.

Integrating AI into Academic Research - Course Intro PowerPoint Presentation Click here to download this presentation. **Note:** The facilitator guide is included in the speaker notes.	
Annotated Bibliography Infographic Job Aid is a supplemental handout for learners to reference when completing the activities for this lesson. Click here to download the infographic.	
The Annotated Bibliography worksheet is designed to guide learners through each step of using GenAI to search, evaluate, and write a comprehensive annotated bibliography. Click here to download the worksheet.	

Lesson Breakdown and Teaching Notes

This lesson introduces students to the role of Artificial Intelligence (AI) in academic research, explores commonly used AI tools, and develops their ability to use these tools critically and effectively in various research stages.

Introduction to AI in Research: 15-30 Minutes

Visual Aid:
Present Slide 1 to illustrate the integration of AI in research

- **Discussion Prompt:**
  - Begin with a brief discussion on traditional vs. AI-enhanced research methods. Ask students about their current research processes and if they have used any AI tools.

Example Discussion Prompts and Answers

Discussion Prompt: Traditional vs. AI-Enhanced Research Methods

- How do your current research processes compare to those enhanced by AI tools?
  - **Explanation:** Traditional research processes often involve manual data collection, literature review, and data analysis, which can be time-consuming and prone to human error. In contrast, AI-enhanced research tools automate many of these tasks, offering efficiency and precision. AI tools like Google Scholar can quickly sift through vast amounts of academic literature to provide the most relevant studies, while citation management tools like EndNote and Mendeley simplify organizing and sharing resources.

- Have you had any experience using AI in your research, and what differences did you notice?
  - **Explanation:** In my experience, using AI tools has significantly streamlined the research process. For instance, Google Scholar's algorithm effectively ranks papers by relevance, saving time during the literature review phase. Citation tools automatically generate bibliographies, reducing the likelihood of errors. The use of AI has made the research process more efficient and allowed me to focus more on analysis and interpretation rather than administrative tasks.

Interactive Session Prompt: AI's Impact on Research Methodologies

- In what ways do you think AI might transform traditional research methodologies?
  - **Explanation:** AI has the potential to revolutionize research methodologies by making data collection and analysis faster and more accurate. It can identify patterns and insights that might be overlooked by humans. Machine learning algorithms can analyze complex datasets, providing new perspectives and deeper insights. AI tools can also facilitate collaboration by enabling real-time data sharing and analysis across different geographic locations.

- Why is adaptability important in this context, and how can AI streamline tasks like data sorting and analysis?
    - **Explanation:** Adaptability is crucial because the research landscape is constantly evolving with technological advancements. Researchers must be open to integrating new tools and methods into their processes. AI streamlines tasks like data sorting and analysis by automating repetitive tasks, allowing researchers to focus on interpreting results and generating new hypotheses. This adaptability can lead to more innovative research outcomes.

Case Study Exploration Prompt: Real-World AI Integration

- Let's explore a case study that showcases AI's role in a successful research project. How does this example illustrate AI's impact, and what connections can you draw to the theoretical concepts we've discussed?
    - **Explanation:** Consider a case study where AI was used in medical research to predict disease outbreaks. By analyzing patterns in data from social media, news reports, and health records, AI algorithms were able to predict outbreaks with a high degree of accuracy. This example illustrates AI's ability to process and analyze large datasets quickly and efficiently, providing valuable insights that can inform public health strategies. It connects to the theoretical concepts of AI enhancing data analysis capabilities and enabling proactive decision-making.

Creative Brainstorming Prompt: AI Applications in Specific Fields

- What are some innovative ways AI could be further integrated into your specific field of study?
    - **Explanation:** In the field of environmental science, AI could be used to predict climate change impacts by analyzing satellite imagery and meteorological data. Machine learning models could forecast weather patterns and assess the effectiveness of conservation efforts. AI could also enhance ecosystem monitoring by providing real-time data analysis.

- How might these applications enhance your understanding and use of AI in research?
    - **Explanation:** These applications would provide a deeper understanding of AI's potential to transform environmental research. By improving predictive models and data analysis, AI can lead to more effective conservation strategies and a better understanding of ecological dynamics. This would enhance my ability to apply AI tools in research, fostering more innovative and impactful studies.

Exploration of AI Tools: 30 Minutes

Visual Aid:
Use Slide 2 to provide a visual glimpse of these tools' interfaces.

- **Interactive Demonstration:**

- Demonstrate how to use Google Scholar for literature search. Show how AI algorithms rank relevant papers.
- Introduce EndNote and Mendeley for managing citations and sharing resources. Highlight AI features like automatic citation generation.

Activity: Learning to use AI Tools: 30 Minutes

Purpose:
Use AI tools to simulate a real-world research process by finding, evaluating, and organizing academic sources into an annotated bibliography.

Format: Small Group Work (3-5 students per group)

Activity:
- Divide students into small groups. Assign each group a research topic.
- Instruct them to use AI tools to gather relevant literature, organize their findings, and create a short, annotated bibliography.

Suggested Topics (Instructor May Assign)
- AI and academic writing
- Ethical implications of AI in education
- AI for data visualization in research
- AI in the humanities
- Bias in AI-driven research tools

Instructions for Learners

1. **Form Your Group**
   - Join your assigned group of 3–5 members.
   - Make sure everyone has access to a computer or tablet with internet connectivity.
2. **Review Your Assigned Topic**
   - Your instructor will assign each group a unique research topic (e.g., "AI in climate science," "Ethics of generative AI," or "AI in medical diagnostics").
3. **Use AI Tools to Conduct a Literature Search**
   - Use **Google Scholar**, **Semantic Scholar**, or **Elicit** to search for academic articles, journals, or conference papers.
   - Use **EndNote** or **Mendeley** (if available) to organize your references.
4. **Select and Review Sources**
   - Choose 3–5 relevant, high-quality sources.
   - Read abstracts and skim articles to ensure they are useful and appropriate for your topic.
5. **Create an Annotated Bibliography**
   For each source, write:
   - **Citation** (APA or MLA format)
   - **Summary** (2–3 sentences about the main argument, findings, or focus)

- **Relevance** (1–2 sentences explaining why this source is useful for your topic)

6. **Prepare to Share**
   - Be ready to present your bibliography to the class in a brief 2–3-minute recap.
   - Highlight how the AI tools helped you find and assess the sources.

Instructor Guidance

During the Activity

- **Circulate** the room to monitor group dynamics and answer tool-related or content questions.
- Offer **mini-guided tutorials** if students struggle with search filters or evaluating credibility.
- Encourage critical thinking: ask students *"Why did you choose this source?"* or *"How does this article add to your understanding?"*

Support Tools

- Provide a **handout or slide** with step-by-step screenshots of Google Scholar and Mendeley.
- Share a **template** for the annotated bibliography (optional, for lower-level learners).

Evaluation Criteria (for Instructor Use)

Criteria	Excellent (3)	Satisfactory (2)	Needs Improvement (1)
Use of AI Tools	Used effectively & independently	Used with some guidance	Minimal or ineffective use
Source Quality	Academic, relevant, and diverse	Mostly relevant	Off-topic or low-quality
Annotations	Clear, concise, insightful	Basic summaries	Incomplete or unclear
Group Collaboration	Collaborative and balanced	Moderate collaboration	Uneven participation

Critical Assessment: 20 Minutes

Group Discussion Prompt:
Discuss the advantages and limitations of AI in research using Slide 3.

- **Activity:**
  - Have each group presens their findings and discuss how AI tools helped or hindered their research process.

Instructions for Learners

1. **Prepare Your Group Presentation**
   Each group will give a brief (3–4 minute) presentation covering:
   - A summary of the research topic they explored

- 2–3 key sources they included in their annotated bibliography
- How AI tools were used to search, evaluate, or organize information
- Any **challenges**, limitations, or frustrations they encountered using AI
- Their overall impression: Did AI help? If so, how? If not, why?

2. **Assign Speaking Roles**
   - Divide speaking parts so that each group member contributes. Example:
     - Student A: Introduces the topic
     - Student B: Describes how the group used AI tools
     - Student C: Shares a challenge or limitation
     - Student D: Wraps up with key takeaways
3. **Practice**
   - Take 5–10 minutes to rehearse your presentation and ensure smooth transitions.
4. **Present to the Class**
   - Speak clearly and concisely.
   - Use your notes but avoid reading word-for-word.
   - Be ready to respond to one or two questions from peers or the instructor.

Suggested Reflection Questions for Groups

Encourage your group to think about and discuss:

- Which AI tools were most useful—and why?
- Did AI help you save time or increase accuracy?
- Were there any moments when you felt limited or misled by AI results?
- What would you do differently next time when using AI for research?

Instructor Guidance

Before Presentations

- Let students know how much time each group has and emphasize clarity and reflection over polish.
- Remind students to include both **practical use** and **critical insight** about the AI tools.

During Presentations

- Use a simple rubric or checklist to track how each group addresses:
  - Tool usage
  - Reflections on pros/cons
  - Engagement from multiple group members
- Ask follow-up questions like:
  - "Would you use that tool again—why or why not?"
  - "Did any tool give unexpected or surprising results?"

After Presentations

- Facilitate a whole-class discussion:
  - "What common patterns did we hear?"
  - "Did anyone have a different experience with the same tool?"
  - "What ethical or methodological concerns came up?"

Evaluation Criteria (Instructor Use)

Criteria	Excellent (3)	Satisfactory (2)	Needs Improvement (1)
Content & Insight	Clear topic summary and thoughtful AI tool reflection	Basic explanation of tools used	Vague or incomplete content
Engagement & Collaboration	All members contributed meaningfully	Most members participated	One or two dominated
Critical Thinking	Discussed both benefits and limitations	Mentioned one perspective only	Lacked reflection
Presentation Skills	Clear, organized, within time	Slightly disorganized or rushed	Unclear or unprepared

Closing: 15 Minutes

Reflection Prompt:
Ask students to reflect on how AI tools can be integrated into their future research projects.

- **Q&A Session:** Open the floor for questions and provide additional resources for further learning.

References and Attributions

AI Use Disclosure
This document was created using Created using Canva Magic Write, Canva AI, and Copilot to outline a lesson plan and supplemental learning materials provided for this module. Copilot was prompted to provide a lesson plan template for teaching higher ed students on how to efficiently and ethically use GenAI to conduct and generate an annotated bibliography using the appropriate format.

Please note the materials provided in this document were modified from the original GenAI output to meet the instructional needs of the lesson/course outline.

1. Google. (n.d.). *Google Scholar*. https://scholar.google.com
   (Tool used for AI-enhanced literature searches.)
2. Elsevier. (n.d.). *Mendeley reference manager*. https://www.mendeley.com
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3. Clarivate. (n.d.). *EndNote reference management software*. https://endnote.com
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4. Allen Institute for AI. (n.d.). *Semantic Scholar*. https://www.semanticscholar.org
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5. Ought. (n.d.). *Elicit: The AI research assistant*. https://elicit.org
   (Tool explored for generating and refining research queries.)
6. OpenAI. (n.d.). *ChatGPT*. https://chat.openai.com
   (Possibly referenced in instructional examples of GenAI usage.)

CC License Information

7. Canva. (n.d.). *Magic Write*. https://www.canva.com/tools/magic-write
(Used to develop instructional content.)
8. Microsoft. (n.d.). *Copilot*. https://copilot.microsoft.com
(Used to develop this guide; includes instructional scaffolding.)

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