Chapter 5
Maintaining Academic Integrity in the Era of Large Language Models:
A Guideline for Responsible Prompt Engineering

Nuraisa Novia Hidayati
https://orcid.org/0000-0001-5606-8627
National Research and Innovation Agency (BRIN), Indonesia

Asril Jarin
https://orcid.org/0000-0001-8360-8166
National Research and Innovation Agency (BRIN), Indonesia

Agung Santosa
https://orcid.org/0000-0002-9827-4397
National Research and Innovation Agency (BRIN), Indonesia

Siska Pebiana
https://orcid.org/0009-0006-7473-7541
National Research and Innovation Agency (BRIN), Indonesia

Elvira Nurfadhilah
https://orcid.org/0000-0003-2227-331X
National Research and Innovation Agency (BRIN), Indonesia

Yuyun Wabula
https://orcid.org/0000-0003-4936-1862
National Research and Innovation Agency (BRIN), Indonesia

Andi Djalal Latief
https://orcid.org/0000-0001-9511-8797
National Research and Innovation Agency (BRIN), Indonesia

Radhiyatul Fajri
https://orcid.org/0000-0003-2812-1077
National Research and Innovation Agency (BRIN), Indonesia

Kokoy Siti Komariah
https://orcid.org/0000-0003-2618-3039
National Research and Innovation Agency (BRIN), Indonesia

Tri Sampurno
https://orcid.org/0009-0009-5274-3483
National Research and Innovation Agency (BRIN), Indonesia

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ABSTRACT

This chapter provides comprehensive guidance for academic researchers on effectively integrating Large Language Models (LLMs) in research workflows. Beginning with technical foundations and capabilities, it examines LLMs' architecture, training mechanisms, and specific applications in academic tasks such as text summarization, literature review, data analysis, and code generation. The chapter then offers detailed criteria for model selection and presents advanced prompt engineering techniques, including specificity guidelines, constraint formatting, chain-of-thought prompting, and in-context learning approaches. Particular attention is given to ensuring academic integrity through robust reasoning frameworks, validation protocols, and ethical considerations regarding plagiarism and transparency. The chapter concludes with systematic approaches to critical evaluation, including quality assessment criteria, adapted peer review processes, and standardized documentation practices for LLM implementation in academic research.

INTRODUCTION

Generative AI offers the academic world a powerful tool to address data processing and scientific content production challenges. Previously, the research's labor- and time-intensive nature, including literature compilation and data analysis, often hindered productivity and slowed publication cycles (Shofiah et al., 2023). Large Language Models (LLMs) like GPT-3 and BERT can streamline these processes by generating text, summarizing literature, processing data, and suggesting hypotheses (Bommasani et al., 2021; Brown et al., 2020). However, generative AI also introduces concerns regarding academic integrity and scientific quality. Potential issues include plagiarism, over-reliance on AI-generated content without critical understanding, and the propagation of inaccurate or biased information (Anderson et al., 2018; Floridi & Chiriatti, 2020). Therefore, ethical guidelines for responsible AI use are crucial to maintaining academic integrity and research quality while maximizing the benefits of this technology.

This chapter aims to establish a foundational understanding of Large Language Models (LLMs) and generative AI within an academic context, tracing their evolution and highlighting their transformative potential for research. Early LLMs, like N-gram models, relied on statistical methods to predict word sequences but struggled with context comprehension (Jurafsky & Martin, 2009). The advent of word embeddings, such as Word2Vec (Le & Mikolov, 2014), enabled semantic representation, while transformers introduced attention mechanisms to capture complex linguistic dependencies (Vaswani et al., 2017). Word embeddings led to