

## Chapter 5: AI for Scientific Writing

### 1. Introduction

Artificial intelligence (AI) has become a powerful tool to support scientific writing. It allows:

- saving time,
- improving the quality of writing,
- Helping structure ideas.

However, its use requires critical thinking and adherence to academic standards.

### 2. Assistance in Structuring Assignments and Projects

AI can assist students or researchers in organizing scientific work logically.

#### 2.1 Standard Structure

A scientific document generally follows a standard structure:

- \* Introduction (context, problem statement, objectives)
- \* Methodology: methods used
- \* Results: data obtained
- \* Discussion: interpretation
- \* Conclusion: summary

#### 2.2 Contributions of AI

- \* Proposing detailed outlines
- \* Organizing main ideas
- \* Generating relevant titles and subtitles
- \* Helping formulate research questions

#### 2.3 Best Practices

- \* Always check the coherence of the proposed outline

- \* Adapt the structure to the field of study
- \* Do not automatically accept suggestions

### **Practical Example**

**Topic:** Impact of artificial intelligence on education

✓ **AI-generated outline:**

- Introduction: definition of AI
- Advantages of AI in education
- Limitations and risks
- Conclusion

✓ **Critical analysis:**

- Missing methodology
- Oversimplified structure

✓ **Improved outline:**

- Introduction (context + problem)
- Literature review
- Methodology (survey, analysis)
- Results
- Discussion
- Conclusion

➤ *Student's role: improve and adapt the outline*

### **3. Paraphrasing and Style Improvement**

AI is particularly useful for improving writing quality.

Exemple: <https://quillbot.com/>

### 3.1 Paraphrasing

- Simplifying complex sentences
- Clarifying ideas
- Adapting the level of language (scientific, academic)

#### Exercise 2: Text Paraphrasing

##### Instruction

##### *Initial text:*

*“Artificial intelligence is widely used today in several fields and allows many tasks to be done quickly.”*

Correction 1: simple paraphrasing

*“Artificial intelligence is now used in many fields and enables tasks to be performed quickly.”*

Correction 2: scientific paraphrasing

*“Artificial intelligence is widely applied across multiple sectors, where it contributes to the automation and acceleration of numerous operations.”*

Detailed analysis:

The second version is better in a scientific context because:

- ✓ vocabulary is more precise;
- ✓ style is more academic;
- ✓ it avoids informal expressions.

Key points:

A good paraphrase must:

- ✓ preserve meaning;
- ✓ improve precision;
- ✓ Adapt language level.

## 3.2 Style Improvement

- Grammar and syntax correction
- Text fluency
- Coherence between paragraphs

### Exercise 3: Style Improvement

Instruction: Correct a paragraph manually, then using AI.

#### Initial text:

*“Students use AI in their work. It is useful. But sometimes there are problems. For example, they copy without understanding and this causes difficulties.”*

Improved version:

*“Students increasingly use artificial intelligence in their academic work. This use can be beneficial, particularly for idea generation and writing improvement. However, certain issues arise when content is reproduced without understanding or critical analysis, which can compromise learning quality.”*

Detailed analysis:

Improvements include:

- removing repetition;
- enriching vocabulary;
- improving logical connections;
- Shifting from informal to academic style.

Corrected errors:

- “It is useful” → too weak
- “there are problems” → vague
- “this causes difficulties” → informal

### 3.3 Limitations

- Risk of losing original meaning
- Excessive standardization of style
- Need for human review

## 4. Attention to Plagiarism and Originality

Using AI raises important ethical issues.

Exemple: <https://www.turnitin.com>

<https://www.detectia.abyssoft.net/home>

### 4.1 Risks

- ✓ Unintentional reproduction of existing content
- ✓ Overdependence on AI
- ✓ Lack of personal contribution

### 4.2 Rules to Follow

- ✓ Always cite sources used
- ✓ Paraphrase and understand before using
- ✓ Check originality with anti-plagiarism tools

### 4.3 Best Practices

- ✓ Use AI as a support tool, not a substitute
- ✓ Provide personal analysis
- ✓ Follow academic standards

### Example: Plagiarism Detection

Instructions

Compare an original text, a direct copy, and a reformulation.

### **Original text:**

*“Technology plays an essential role in economic development.”*

Version 1: direct copy

Same sentence → plagiarism

Version 2: personal paraphrase

*“Technological progress is a major factor in economic growth and development.”*

Version 3: AI paraphrase

*“Technological innovation represents a fundamental driver of economic development.”*

### **Analysis:**

- Version 1: direct plagiarism
- Version 2: acceptable if integrated into personal reasoning
- Version 3: correct but must be reviewed

### **Conclusion:**

AI does not guarantee originality.

Students must:

- understand the idea;
- genuinely rephrase it;
- Cite sources if necessary.

## **5. Translation and Multilingual Writing**

AI facilitates scientific communication across languages.

Exemple : <https://www.deepl.com/fr/translator>

<https://translate.yandex.com>

## **Exercise 5: Assisted Writing**

**Topic:** Use of AI in higher education

Student version:

*“Today artificial intelligence is used in universities. It helps students and teachers. This technology becomes important in education.”*

Improved version:

*“Artificial intelligence is playing an increasingly important role in higher education. It is used by both students and teachers for information retrieval, content organization, and the improvement of academic production. This evolution raises both pedagogical opportunities and major ethical challenges.”*

### **Detailed Answer Key**

The improved version is more effective because it:

- introduces the topic in a more academic manner;
- clarifies the uses;
- announces an implicit problem.

### **5.1 Translation**

- Fast translation of scientific texts
- Terminological adaptation
- Understanding foreign articles

### **Example: Scientific translation**

French to English

*“La recherche scientifique joue un rôle essentiel dans le développement technologique.”*

**Simple translation:**

*“Scientific research plays an essential role in technological development.”*

### More academic:

*“Scientific research plays a crucial role in driving technological development.”*

### Analysis:

Both versions are correct, but the second is more natural in academic English because:

- Crucial

role is common in scientific texts;

- driving technological development better expresses the idea of an engine of progress.

### Important note:

An accurate translation is not simply a matter of replacing words; it also requires respecting the conventions of scientific language.

## 5.2 Multilingual Writing

- Writing directly in a foreign language
- Academic style correction
- Vocabulary standardization

**Example: Write a paragraph in English and then improve it with AI.**

### Initial text:

*“AI is very important in education and help students learn faster. It also give many tools for teachers.”*

### Improved version:

*“Artificial intelligence plays an important role in education and helps students learn more efficiently. It also provides teachers with a wide range of tools to support instruction and assessment.”*

## Detailed analysis

Corrections made:

- Help → helps;
- Give → provides;
- Style improvement with learn more efficiently;
- Vocabulary refinement with instruction and assessment.

## Why this answer key is better

It corrects:

- Grammar;
- Lexical precision;
- Text fluency.

## 5.3 Limitations

- ✓ Contextual translation errors
- ✓ Misinterpretation of technical terms
- ✓ Need for human validation

## 6. Conclusion

AI is a powerful tool for scientific writing, but its use must be supervised. It improves structure, style, and accessibility, while requiring vigilance regarding ethics and originality.

## 7. Key Takeaways

- ✓ AI is a support tool, not a replacement
- ✓ Human verification is essential
- ✓ Originality remains fundamental
- ✓ Responsible use of AI is crucial in academia

| <b>Situation</b> | <b>Poor Practice</b> | <b>Recommended Practice</b>     |
|------------------|----------------------|---------------------------------|
| AI Usage         | Copying and pasting  | Rewriting and verifying         |
| Translation      | Literal translation  | Contextual adaptation           |
| Writing          | Fully automated text | Text refined with AI assistance |