Chapter 4: AI for Scientific Writing

- Assistance with structuring assignments and research projects
- Rewriting and style improvement
- Plagiarism and Originality issues
- Translation and multilingual scientific writing

❖ 4.1. General Introduction

- Scientific writing requires **clarity, coherence, and precision**. With the increasing number of publications, producing high-quality texts quickly has become challenging. **Artificial Intelligence (AI)** has become a key tool to assist authors in writing, reviewing, translating, and detecting plagiarism.

Objectives

- **Understand the role and importance of AI in scientific writing.**
- **Learn how to structure an assignment or research project.**

❖ 4.1. General Introduction

Objectives

- Improve clarity, style, and coherence in scientific texts.
- Discover assistance tools and their limitations.
- Raise awareness of plagiarism and ethical issues.

Chapter 4: Artificial Intelligence for Scientific Writing

❖ **4.2.Definition :** AI applied to scientific writing uses algorithms to **produce, review, and improve scientific texts**. It allows faster writing, ensures coherence, and maintains academic style.

❖ **Examples of Applications**

Function	Tool	Description
Automatic rewriting	ChatGPT	Reformulates text without changing meaning
Grammar correction	Grammarly, LanguageTool	Detects errors and suggests corrections
Scientific style	LanguageTool	Standardizes vocabulary and tone
Translation	DeepL, Google Translate	Multilingual technical translation
Plagiarism detection	Turnitin, iThenticate	Identifies similar content

❖ 4.3. Structuring an Assignment or Research Project

- Scientific writing should follow a **clear structure** to be understandable.
- **A- Introduction**
  - **Present the topic and its scientific context.**
  - **Identify the problem statement.**
  - **Define objectives and hypotheses.**

Example:

- **Topic:** Using AI to Predict Cardiovascular Diseases
- **Problem Statement:** How to improve prediction accuracy using medical data?
- **Objectives:** Study different AI models and analyze their performance

❖ 4.3. Structuring an Assignment or Research Project

- **B-Methodology**
  - Describe methods used: experimentation, data analysis, simulations.
  - Explain tools and datasets used.
  - Detail the process step by step.
- **C-Results and Discussion**
  - Present results with tables, graphs, or diagrams.
  - Analyze and interpret findings.
  - Compare with similar studies.

❖ 4.3. Structuring an Assignment or Research Project

- **D-Conclusion**
  - **Summarize key points.**
  - **Discuss practical and scientific implications.**
  - **Suggest directions for future research.**
- **AI Tip:** Some tools can automatically generate a structured plan from a summary or scientific corpus.

❖ 4.4. Writing Assistance Techniques

- Writing assistance techniques use artificial intelligence to **improve the quality of scientific texts**.
- They **help clarify ideas**, **correct errors** and **standardize academic style**.
- The goal is to make documents more readable and professional while preserving the original meaning of the sentences.
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❖ 4.4. Writing Assistance Techniques

.1 Automatic Rewriting

- Automatic rewriting reformulates sentences to make them clearer and more fluent without changing their meaning. It helps simplify complex formulations and improve readability.
- **For example**, a raw sentence like **“The model was tested on 100 samples”** can be transformed by AI into “**We tested the model on a total of 100 samples**” for greater precision and naturalness.

❖ 4.4. Writing Assistance Techniques

2 Grammar and Spelling Correction

- This technique automatically detects and corrects grammatical, spelling, and punctuation errors. It includes checking conjugation, syntax and sentence consistency.
- **Popular tools such as : Grammarly, LanguageTool, Microsoft Editor** facilitate this process, **reducing mistakes** and improving the scientific credibility of the text.

❖ 4.4. Writing Assistance Techniques

3 Scientific Style Suggestions

- AI provides suggestions to standardize scientific style, vocabulary and academic tone.
- It also checks the consistency of headings, subheadings, and sections to properly structure the document.
- This technique helps authors follow academic conventions and produce a coherent and professional text.

❖ 4.4. Writing Assistance Techniques

4 Practical Exercise

- The practical exercise involves comparing a raw text with its AI-enhanced version.
- The goal is to identify the changes, such as clarity, style, and precision.
- This allows students to understand concretely how AI improves scientific writing quality and to apply these techniques to their own texts.

❖ 4.5. Plagiarism and Originality

- **1.Introduction**
- In academic and scientific contexts, the production of written work is based on fundamental principles of integrity, rigor, and originality.
- The widespread availability of digital resources has facilitated access to information; however, it has also increased the risk of inappropriate practices such as plagiarism.

❖ 4.5. Plagiarism and Originality

- **1.Introduction**

- Therefore, it is essential for students to understand the principles of academic ethics, particularly regarding citation, paraphrasing, and scientific writing.

❖ 4.5. Plagiarism and Originality

• 2. Definition of Plagiarism

- Plagiarism can be defined as the total or partial appropriation of another person's work without explicitly acknowledging the source.
- This practice includes not only the reproduction of text, but also the use of ideas, methods, data, figures, or computer code.
- Thus, any information derived from an external source must be properly referenced to ensure transparency and traceability in scientific work.

❖ 4.5. Plagiarism and Originality

3. Types of Plagiarism

- Plagiarism can take several forms:
- **Direct copying (copy-paste)**: reproducing text without modification or citation.
- **Uncited paraphrasing**: rewording content without acknowledging the source.
- **Translation without attribution**: translating content from another language without citation.

❖ 4.5. Plagiarism and Originality

3. Types of Plagiarism

- **Code plagiarism**: reusing programming code without indicating its origin.
- **Self-plagiarism**: reusing one's own previous work without proper disclosure.
- All these forms constitute violations of academic standards, even when unintentional.

❖ 4.5. Plagiarism and Originality

4. Implications and Consequences of Plagiarism

- Respecting academic integrity is essential for several reasons:
- **Pedagogical**: plagiarism prevents the development of analytical and critical thinking skills.
- **Scientific**: it undermines the reliability and credibility of research.
- **Institutional**: it may lead to disciplinary actions.
- Consequences may include a failing grade, rejection of assignments, or, in research contexts, paper rejection.

❖ 4.5. Plagiarism and Originality

5. Preventing Plagiarism

- To avoid plagiarism, students should adopt the following practices:

  ✓**Understanding the content**

- Students must fully understand the material before rewriting it.

  ✓**Personal paraphrasing**

- Writing should be done using one's own words and structure, avoiding mechanical reproduction.

  ✓**Proper citation**

- All borrowed information must be referenced according to academic standards.

  ✓ **Source organization**

- It is recommended to systematically keep track of consulted references.

❖ 4.5. Plagiarism and Originality

6. Importance of Originality

- Originality is a fundamental criterion in the evaluation of academic work. It reflects the student's ability to analyze, interpret, and synthesize information independently.
- An original work does not merely present results but also includes personal and critical insights.

❖ 4.6. Translation and Multilingual Scientific Writing

1. Context and Importance

- In the field of computer science, most scientific publications are written in English, while teaching may be conducted in French or Arabic.
- This situation requires students to develop skills in multilingual scientific writing and translation.

❖ 4.6. Translation and Multilingual Scientific Writing

2. Main Challenges

- Several challenges may arise:
- **Literal translation**: often leads to syntactic and semantic errors.
- **Loss of scientific meaning**: due to insufficient understanding of the content.
- **Stylistic differences**: each language follows its own academic conventions.

❖ 4.6. Translation and Multilingual Scientific Writing

3. Principles of Scientific Translation

- High-quality scientific translation relies on the following principles:
- ✓**Prior understanding**
- The source text must be fully understood before translation.
- ✓ **Contextual adaptation**
- Translation should convey meaning rather than translate words individually.
- ✓**Terminological consistency**
- Technical terms must be used consistently throughout the text.

❖ 4.6. Translation and Multilingual Scientific Writing

4. Scientific Writing

Scientific writing is characterized by:

- clarity and precision
- use of specialized vocabulary
- structured and concise sentences
- The goal is to communicate ideas and results effectively without ambiguity.

❖ 4.6. Translation and Multilingual Scientific Writing

• 5. Multilingual Illustration

Consider the following example:

- **French:**
  Cette étude propose une méthode innovante pour la prédiction du diabète.
- **English:**
  This study proposes a novel method for diabetes prediction.
- **Arabic:**
  تقدم هذه الدراسة منهجية مبتكرة للتنبؤ بمرض السكري.
- This example highlights the importance of preserving scientific meaning while adapting to linguistic conventions.