Chapter 6: AI and Academic Creativity

Chapter Objectives

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

- ✓ Understand the role of artificial intelligence in academic creativity
- ✓ Generate project ideas using AI tools
- ✓ Use AI to organise effective brainstorming sessions
- ✓ Create AI-assisted scientific presentations and posters

1. Generating project ideas

1.1. Why use AI?

Artificial intelligence enables you to:

- ✓ Quickly explore several avenues of research
- ✓ Draw inspiration from a variety of fields
- ✓ Overcome writer's block

AI acts as a **creative assistant**, not a replacement.

1.2. AI-based generation methods

a) Rephrasing themes

Example:

- ✓ Original topic: Analysis of functions
- ✓ With AI:
  - Applications of functions in economics
  - Modeling of physical phenomena
  - Interactive graphical visualization

b) Combination of fields

AI can facilitate interdisciplinary combinations:

* Mathematics + AI → machine learning

* Mathematics + environment → climate modeling

* Mathematics + medicine → medical imaging

c) Guided questions

Students may ask:

- ✓ What are the current problems related to…?
- ✓ Suggest 5 ideas for simple projects on…

1.3. Practical example

Topic requested from the AI:

- ➢ Suggest project ideas in mathematics for beginners

Possible results:

- ✓ Study of numerical sequences in finance
- ✓ Simulation of population growth
- ✓ Analysis of sports statistics

1.4. Limitations

- ✓ Some ideas may be too general
- ✓ Requires validation by the teacher
- ✓ Risk of over-reliance

Example 1: Programming (beginner level)

Ask the AI:

Suggest some simple Python project ideas for beginners

Possible results:

- Simple calculator (addition, multiplication, etc.)
- Number guessing game
- Password generator

- Converter (temperature, currency)

Example 2: Data structures

Ask the AI:

Give some ideas for projects using lists and dictionaries

AI responses:

- Managing a contact list
- Mini student management system
- Data sorting program

2. AI-assisted brainstorming

2.1. Definition

Brainstorming is a technique for generating ideas in a group or individually.

AI can:

- Speed up the process
- Organize ideas
- Suggest alternatives

2.2. Steps in brainstorming with AI

1-Define the problem

Example:

- How can mathematics be applied in everyday life?

2- Generate ideas with AI

Ask:

- Give 10 ideas without explanation
- Sort the ideas by difficulty

3- Organize ideas

AI can:

- Group by theme
- Create categories
- Suggest an outline

4- Select the best ideas

Criteria:

- Feasibility
- Originality
- Appropriate level

2.3. Effective techniques

* Divergent brainstorming

✓ → generating lots of ideas

* Convergent brainstorming

✓ → selecting and refining ideas

2.4. Example

Question:

➢ How can statistics be used in a student project?

AI answers:

- Analysis of a class's marks
- Study of eating habits
- Survey on social media usage

2.5. Best practices

- Always rephrase your answers
- Check the information

- Add your own thoughts

3. Creating scientific presentations or posters

3.1. The role of AI

AI can help to:

- ✓ Structure a presentation
- ✓ Generate clear content
- ✓ Improve the design

3.2. Structure of a presentation

- ✓ Standard outline: (Plan classique)

1. Introduction
2. Problem
3. Methodology
4. Results
5. Conclusion

AI can generate this outline automatically.

3.3. Creating slides

AI can:

- ✓ Summarize a long text
- ✓ Suggest clear headings(Titles)
- ✓ Simplify explanations

Example:

Text → automatic summary for slide

3.4. Scientific posters

- ✓ Content:

- Title
- Objective
- Method
- Results
- Conclusion

✓ **Contribution of AI:**

- Scientific reformulation
- Creation of visuals
- Content organisation

3.5. Practical advice

✓ Clarity

- Use short sentences
- Avoid clutter

✓ Visuals

- Simple graphics
- Easy-to-read colors

✓ Consistency

- Maintain a logical structure

3.6. Limitations

- AI can produce errors
- Need to check content
- Importance of personalization

Conclusion of the chapter

Artificial intelligence is a powerful tool for stimulating academic creativity, but it must be used critically.

It allows users to:

- Rapidly explore ideas
- Organizing one's thinking
- Produce high-quality materials

However:

- The student remains the key player
- Human validation is essential

Suggested activities

Exercise 1

Use AI to generate 5 ideas for math's projects.

Exercise 2

Conduct an AI-assisted brainstorming session on a given topic.

Exercise 3

The complete process: from idea to IT project

STEP 1 Generating project ideas (WHAT to do?)	Examples: - Calculator - Simple game - Student management system - Web application
STEP 2 Brainstorming (general)	- Explore several ideas - Compare the options - Choose the best idea
STEP 3 Technical brainstorming (HOW to do it?)	- Which programming languages? (Python, C…) - Which data structures? (lists, files, etc.) - Interface? (console, graphical) - Algorithms?

STEP 4 Project design	- Program outline - Code organisation - Task breakdown
STEP 5 Implementation / Coding	- Writing the code - Testing - Debugging
STEP 6 Project presentation	- Slide show - Scientific poster - Program demonstration