

Assignment 8: AI Benefits & Challenges

Describe the function related to education that you would like the LLM to perform.

Develop a series of assignments for a class I teach. I would like help developing assignments with varying types of submissions, so that students have to critically think in AP2. I would like to include more assignments that require small group work and problem solving/critical thinking.

Develop a prompt that you will provide the LLM to execute the task.

Develop four different assignments for an anatomy and physiology college level course that require critical thinking and problem solving. Include the following systems: cardiovascular, immune, respiratory, urinary, digestive or reproductive.

LLM Response

Assignment 1: Clinical Case Study Analysis

Title: Integrative Cardiovascular and Respiratory System Case Study

Learning Objectives

Students will:

- Apply anatomy and physiology concepts to a clinical scenario.
- Explain physiological mechanisms responsible for disease symptoms.
- Interpret diagnostic findings.
- Recommend evidence-based interventions.

Case Scenario

A 68-year-old patient arrives at the emergency department complaining of shortness of breath, chest pressure, fatigue, and swelling of both ankles. The patient has a history of hypertension, smoking, and hyperlipidemia.

Vital Signs:

- Blood Pressure: 168/98 mmHg
- Heart Rate: 112 bpm
- Respiratory Rate: 28 breaths/min
- Oxygen Saturation: 88%
- Temperature: 98.6°F

Diagnostic Results:

- Chest X-ray shows pulmonary edema.
- Echocardiogram demonstrates decreased left ventricular ejection fraction.
- Arterial blood gases indicate respiratory acidosis.

Student Tasks

1. Explain the normal physiology of:
 - Cardiac output
 - Gas exchange
 - Pulmonary circulation
2. Identify how the patient's symptoms relate to altered physiology.
3. Explain why pulmonary edema developed.
4. Interpret each diagnostic finding.
5. Predict possible complications if left untreated.
6. Recommend three medical interventions and explain their physiological basis.

Deliverable

3–5-page report with diagrams and references.

Assessment

- Physiological reasoning (40%)
- Accuracy (30%)
- Critical thinking (20%)
- Organization and writing (10%)

Assignment 2: Immune System Investigation

Title: Why Did the Patient Become Seriously Ill?

Learning Objectives

Students will:

- Analyze immune responses.
- Compare innate and adaptive immunity.
- Evaluate laboratory data.
- Develop evidence-based conclusions.

Scenario

A college student develops:

- Fever
- Fatigue
- Swollen lymph nodes
- Persistent cough

Laboratory Results

Test	Result
WBC	Elevated
Neutrophils	Elevated
Lymphocytes	Low
CRP	Elevated
Chest CT	Localized lung infection

After 5 days of antibiotics, symptoms worsen.

Additional testing reveals the patient has untreated HIV.

Student Questions

1. Compare innate versus adaptive immunity in this case.
2. Explain why antibiotics were ineffective.
3. Describe how HIV affects immune function.
4. Explain why opportunistic infections occur.
5. Predict long-term physiological consequences.
6. Recommend prevention strategies for future infections.

Extension Activity

Students create a flowchart illustrating the immune response from pathogen entry to disease progression.

Deliverable

Infographic plus 2-page explanation.

Assignment 3: Organ Systems Problem-Solving Project

Title: The Mystery of Multiple Organ Dysfunction

Learning Objectives

Students integrate physiology from:

- Digestive
- Urinary
- Cardiovascular
- Respiratory

Case

A 45-year-old patient presents with:

- Vomiting
- Severe diarrhea
- Low blood pressure
- Rapid heart rate
- Reduced urine output
- Dry mucous membranes

Laboratory Results

Test	Result
Sodium	High
Potassium	Low
BUN	Elevated
Creatinine	Elevated
Hematocrit	Elevated

Student Tasks

1. Explain how dehydration affects:
 - Blood volume
 - Blood pressure
 - Kidney filtration
 - Oxygen delivery

2. Explain why urine output decreased.
3. Describe compensatory mechanisms involving:
 - ADH
 - RAAS
 - Sympathetic nervous system
4. Predict what would happen if fluid replacement is delayed.
5. Design a treatment plan and justify each recommendation physiologically.

Deliverable

Concept map plus written analysis.

Assignment 4: Comparative Systems Challenge

Title: The Physiology Behind Reproduction and Pregnancy Complications

Learning Objectives

Students evaluate interactions between:

- Reproductive
- Cardiovascular
- Urinary
- Immune

Scenario

A pregnant patient at 32 weeks develops:

- High blood pressure
- Protein in urine
- Generalized edema
- Headache
- Blurred vision

Diagnosis: Preeclampsia

Student Tasks

1. Explain normal physiological changes during pregnancy.
2. Describe how the cardiovascular system adapts during pregnancy.
3. Explain why protein appears in urine.
4. Discuss placental function and how impaired blood flow contributes to symptoms.
5. Predict maternal and fetal complications.

6. Compare normal pregnancy physiology with preeclampsia.
7. Propose a monitoring and treatment plan supported by physiology.

Deliverable

5-minute presentation and 4-page written report.

Optional Critical Thinking Extension (Applicable to All Assignments)

For each assignment, students should include a reflection addressing:

1. Which physiological mechanisms were most difficult to understand?
2. Which body systems interacted most significantly?
3. What additional information would improve your clinical decision-making?
4. How did this case illustrate the importance of homeostasis?
5. If you were the healthcare provider, what additional diagnostic tests would you order and why?

Suggested Grading Rubric (100 Points)

Criteria	Points
Understanding of anatomy and physiology	25
Application of physiological concepts	25
Critical thinking and problem solving	20
Interpretation of clinical data	15
Use of scientific evidence and references	10
Organization, clarity, and professionalism	5

My Prompt (Follow-Up #1)

i love the assignments, can we add more student engagement and responses

LLM Response

Absolutely. One of the best ways to increase engagement is to move students from simply **answering questions** to **making decisions, defending their reasoning, collaborating, and reflecting on alternative outcomes**. Below are enhanced versions of the assignments with interactive components and opportunities for higher-order thinking (Bloom's Taxonomy: Analyze, Evaluate, Create).

Assignment 1: Clinical Case Conference

Integrative Cardiovascular & Respiratory Systems

Scenario

Students receive the patient's chart in stages rather than all at once. New information is released after they make initial decisions, mimicking real clinical practice.

Student Tasks

Part 1 – Initial Assessment

Based only on the patient's history and vital signs:

- What is your preliminary diagnosis?
- Which body systems are involved?
- What additional information do you need before making a diagnosis?
- List three diagnostic tests you would order and justify each one.

Student Response: 250–300 words

Part 2 – Diagnostic Interpretation

Students receive laboratory results, imaging, and arterial blood gases.

Students answer:

- Did your initial diagnosis change? Why or why not?
- Which results are most concerning?
- Explain the physiological mechanism behind each abnormal finding.
- Which organ system is primarily responsible for the patient's symptoms?

Part 3 – Clinical Decision Making

Imagine you are the healthcare provider.

Choose ONE intervention to begin immediately:

- Oxygen therapy
- Diuretics
- ACE inhibitor
- Nitroglycerin

Students must defend their choice using anatomy and physiology.

Part 4 – Discussion Board

Students respond to classmates:

- Do you agree with their treatment?
- What evidence supports your position?
- Suggest one additional intervention.

Each student must make:

- One original post
- Two evidence-based replies

Reflection

What surprised you most about this case?

What would happen if treatment were delayed 48 hours?

Assignment 2: Immune System Medical Mystery

Instead of simply reading the diagnosis...

Students become medical investigators.

Evidence Folder #1

Symptoms only

Students develop:

- Three possible diagnoses
- Evidence supporting each diagnosis

- Evidence against each diagnosis

Evidence Folder #2

Laboratory values

Students eliminate one diagnosis.

Explain why.

Evidence Folder #3

Imaging

Students revise their conclusions.

Evidence Folder #4

Positive HIV test

Students answer:

How does this new information change your understanding?

Explain using immune physiology.

Team Challenge

Each group creates:

A disease progression timeline showing

Exposure

↓

Innate immune response

↓

Adaptive response

↓

Immune dysfunction



Clinical symptoms



Treatment

Exit Reflection

If this patient had received earlier treatment,

How would the immune response differ?

Assignment 3: Escape Room – The Dehydration Crisis

Students work in teams.

Their goal:

Save the patient before organ failure occurs.

Each correct answer unlocks the next clue.

Challenge 1

Blood Pressure Falls

Question:

Explain why.

Correct explanation unlocks:

Laboratory data

Challenge 2

Kidney Function Declines

Students interpret:

- BUN
- Creatinine
- Sodium
- Potassium

Then predict:

What hormone will increase first?

Why?

Challenge 3

The Physician Arrives

Students must recommend:

- IV fluids
- Electrolyte replacement
- Oxygen
- Medication

They earn points for physiological reasoning.

Final Challenge

Design a treatment timeline.

0–30 minutes

30–60 minutes

1–4 hours

24 hours

Explain what happens physiologically during each phase.

Reflection

Which organ system was affected first?

Which organ system would fail next?

Explain your reasoning.

Assignment 4: Pregnancy Physiology Grand Rounds

Students become specialists.

Each student receives one professional role.

Examples

Obstetrician

Nephrologist

Cardiologist

Neonatologist

Critical Care Nurse

Clinical Pharmacist

Individual Preparation

Students answer

How does this patient's condition affect your specialty?

What concerns you most?

What treatment do you recommend?

Support with physiology.

Team Meeting

Students present their recommendations.

The group develops one treatment plan.

Debate

Two teams compare plans.

Each team must defend:

- Diagnostic priorities
- Treatment choices
- Monitoring strategies

Reflection

If the patient refused treatment,

Predict:

24 hours

72 hours

One week

How would maternal and fetal physiology change?

Student Engagement Additions for Every Assignment

1. Think–Pair–Share

Students answer independently.

Discuss with a partner.

Revise responses after discussion.

2. Clinical Decision Poll

After reading the case:

Students anonymously vote:

"What would you do first?"

After discussion,

Vote again.

Compare changes.

3. "What If?" Scenarios

At the end of every assignment,

students choose one variation.

Examples:

What if the patient also had diabetes?

What if the patient were 8 years old?

What if the patient lived at high altitude?

What if the patient refused treatment?

Students explain how physiology would change.

4. Patient Education Challenge

Students must explain the diagnosis

to a patient with no medical background.

Maximum:

200 words

This assesses true understanding rather than memorization.

5. Concept Mapping

Students create a visual map connecting

- Symptoms
- Anatomy

- Physiology
- Laboratory values
- Diagnosis
- Treatment
- Homeostasis

6. Reflection Journal

Students conclude each assignment by responding to prompts such as:

- Which physiological concept was most challenging?
- What evidence most influenced your clinical decision?
- What misconception did you have before completing this assignment?
- How did this case illustrate the interconnectedness of body systems?
- If additional information had been available, what would you have wanted and why?

These additions transform the assignments from traditional case analyses into active learning experiences where students investigate evolving scenarios, defend clinical decisions, collaborate with peers, communicate science to different audiences, and reflect on their reasoning. This approach mirrors the kinds of analytical and communication skills expected in healthcare and upper-level science courses.

My Follow-up Prompt (Follow-Up #2)

can you develop rubrics for the original assignments?

LLM Response

Assignment 1 Rubric

Clinical Case Study Analysis: Cardiovascular & Respiratory Systems (100 points)

Criteria	Exemplary (A)	Proficient (B)	Developing (C)	Beginning (D/F)	Po int
Understa nding of Anatomy &	Demonstrates comprehensive understanding of cardiovascular and respiratory anatomy and physiology;	Demonstrates solid understanding with only	Demonstrates partial understanding; several	Demonstrates limited understanding ; major	/25

Analysis of Clinical Findings (25 pts)	Accurately interprets all clinical data and clearly explains the physiological basis for symptoms and	Correctly interprets most findings with adequate	Interprets some findings correctly but explanations	Misinterprets clinical findings or provides little	/25
Evidence-Based Recommendations	Recommends appropriate interventions and thoroughly justifies each using physiological principles.	Recommendations are appropriate with adequate	Recommendations are somewhat appropriate but	Recommendations are inappropriate or	/20
Critical Thinking & Problem	Demonstrates excellent reasoning, synthesizes information effectively, and considers potential	Demonstrates good reasoning with minor gaps in	Demonstrates basic reasoning but relies heavily on	Demonstrates minimal reasoning or analysis.	/20
Organization, Writing, and	Writing is well organized, clear, professional, and free of errors; appropriate scientific references are included.	Organization is logical with few writing or citation errors.	Organization is inconsistent; several writing or citation	Poor organization and numerous writing or	/10

Total: /100

Assignment 2 Rubric

Immune System Investigation (100 points)

Criteria	Exemplary	Proficient	Developing	Beginning	Point
Understanding of Immune	Thoroughly explains innate and adaptive immunity and accurately applies concepts to	Demonstrates solid understanding	Demonstrates partial understanding	Demonstrates minimal understanding	/25
Interpretation of Laboratory	Correctly interprets all laboratory findings and connects them to disease	Correctly interprets most	Interprets some findings correctly but	Incorrect interpretation of laboratory	/20
Clinical Reasoning (20 pts)	Clearly explains disease progression, immune dysfunction, and treatment	Demonstrates sound reasoning	Reasoning is limited or lacks sufficient	Demonstrates little evidence of clinical	/20
Infographic Quality (20 pts)	Visually engaging, scientifically accurate, well organized, and easy to	Accurate and organized with only	Adequate but lacks clarity or visual	Difficult to understand or contains	/20
Written Explanation &	Clear, concise, professional writing with appropriate scientific references.	Well written with minor errors.	Several writing or citation errors.	Poorly written with little supporting	/15

Total: /100

Assignment 3 Rubric

Organ Systems Problem-Solving Project (100 points)

Criteria	Exemplary	Proficient	Developing	Beginning	Point
Integration of Organ Systems (25)	Clearly explains interactions among digestive, urinary,	Explains most system interactions	Demonstrates limited integration	Little evidence of understanding	/25
Application of Homeostatic	Thoroughly explains ADH, RAAS, sympathetic response, and	Correct explanation with minor	Partial explanation with	Limited or incorrect explanation.	/25
Treatment Plan & Justification	Develops an appropriate treatment plan with strong physiological justification.	Appropriate treatment plan with adequate	Treatment plan lacks detail or physiological	Treatment plan is inappropriate	/20
Concept Map (15 pts)	Comprehensive, accurate, well organized, and clearly	Organized and mostly	Some important	Incomplete or inaccurate	/15
Written Analysis (15)	Well organized, scientifically accurate, and	Mostly clear with few	Several writing or	Poorly organized or	/15

Total: /100

Assignment 4 Rubric

Comparative Systems Challenge: Pregnancy & Preeclampsia (100 points)

Criteria	Exemplary	Proficient	Developing	Beginning	Point
Understanding of Pregnancy Physiology (20)	Thoroughly explains normal physiological adaptations across	Accurate explanation with minor	Partial understanding with some	Limited understanding demonstrated.	/20
Analysis of Preeclampsia (25 pts)	Accurately explains pathological changes and relates them to patient	Explains most pathological	Partial explanation with several	Limited or incorrect analysis.	/25

Comparison of Normal vs. Pathological	Insightful comparison demonstrating excellent understanding of	Accurate comparison with minor	Basic comparison lacking	Comparison is incomplete or inaccurate.	/20
Presentation Quality (15 pts)	Professional, engaging, well organized, and effectively communicates	Organized and clear with minor	Adequate but lacks organization	Difficult to follow or incomplete.	/15
Written Report & References (20 pts)	Scientifically accurate, well organized, and supported by appropriate	Well written with few errors.	Several writing or citation	Poorly organized with limited	

Personal Reflection

I really did not need to add too many follow ups for my original prompt! I really liked the output and I actually had to think for a bit on what I would change or add to it. I feel better about my input and the specificity of what I was looking for, and what ChatGPT produced was exactly what I was hoping to get - varied assignments, options for group or individual work, different ways to submit (video, text, etc), integrating multiple organ systems, etc. The benefit to this was that it created a series of critical thinking assignments in seconds, and I was able to expand on the creativity of the output instead of racking my brain trying to come up with ideas from scratch. I have been teaching this class for so long I feel sometime that I have gotten stuck in some traditional assignments - case studies, quizzes, exams. LLM's offer novel ideas that I realize now, have kickstarted my brain in a different way for the same material I've been looking at for almost two decades. A challenge might be ensuring that the content generated by an LLM is accurate, appropriate for the learning objectives, and aligned with course outcomes. While the ideas are creative and can save a significant amount of time, they still require review to verify accuracy, maintain academic rigor, and ensure consistency. As an educator, I plan to incorporate the regular use of LLMs as a tool to enhance both course development and student learning. One of the most valuable applications is generating ideas for assignments, case studies, discussion prompts, and learning activities. Rather than starting from a blank page, I can use an LLM to quickly create multiple approaches to teaching the same concept and then adapt those ideas to meet my course objectives and the needs of my students. I also plan to use LLMs to help me write clear instructions and grading rubrics, and revising course materials to improve clarity and accessibility. I am already in the process of revamping my online courses using the LLM's we've been using this semester - making new

images for modules, editing anatomy lists, etc. Although LLMs can significantly reduce time spent creating content and assignments, and spark creativity, they should serve as a supplement to—not a replacement for—my expertise as an instructor. I will continue to review all AI-generated content for accuracy, make sure it aligns with my course and module learning outcomes, and use LLM outputs as a starting point, not the final result.

I do want to incorporate the growing capabilities of AI in my class, even in science and healthcare. The video with Richard Culatta touched on several points I was not aware of - using scanning electron microscopes from a remote location, performing surgeries without the patient in the room, how learning to read music is changing as well. The medical capabilities of AI will be important for my pre-med/nursing students to understand. I also really appreciated the article about “getting AI right”, where the importance of educators is discussed and how AI can support them. The feedback is something that most of us never receive except from students, and I think their feedback is usually skewed by the grade they earn in class. Being able to receive non-biased feedback to make us more effective educators is another huge benefit to AI.

Chen, C. (2023, March 9). AI will transform teaching and learning: Let’s get it right. Stanford University, Human-Centered Artificial Intelligence,

Culatta, R. (2019) Artificial Intelligence, Education, and Our Two Possible Futures. ISTE