

# CAPSTONE PROJECT

## COURSE CONTENT SIMPLIFICATION AGENT

**Presented By:**

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# OUTLINE

- **Problem Statement** (Should not include solution)
- **Proposed System/Solution**
- **System Development Approach** (Technology Used)
- **Algorithm & Deployment**
- **Result (Output Image)**
- **Conclusion**
- **Future Scope**
- **References**

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# PROBLEM STATEMENT

Educational materials are often filled with technical jargon or advanced concepts that aren't accessible to students with different levels of understanding. Learners struggle to grasp the essence of the subject due to the complexity of faculty notes, textbooks, or online content.

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# PROPOSED SOLUTION

An AI-powered agent that simplifies academic content based on the learner's proficiency—**Beginner**, **Intermediate**, or **Expert**—using IBM Watsonx.ai and the Mistral LLM. This agent rewrites content in plain language, adds context, and enhances personalized learning.

# TECHNOLOGY USED

## Layer:

Cloud Platform

AI Development

Foundation Model

Agent Platform

Runtime Environment

Deployment Tool

## Technology Used:

IBM Cloud Lite

Watsonx.ai

Mistral-Large

IBM Cloud Agent Lab

Watsonx.ai Runtime Service

AI Agent Builder

# ALGORITHM & DEPLOYMENT

## 1. User inputs:

LEVEL: Beginner

CONTENT: [Original academic paragraph]

## 2. The model analyzes the LEVEL and rewrites the content:

- Beginner: Basic words, examples, short sentences
- Intermediate: Balanced technical detail
- Expert: Advanced terminology and deeper insights

Agent returns rewritten content.

## 3. Deployment Steps:

- Created a sandbox project in Watsonx.ai
- Added Watsonx.ai Runtime service
- Built an agent using **Mistral-Large** model
- Set up and deployed the agent using Agent Lab
- Previewed and validated the output

# RESULT

Beginner :



You 07:04 AM

LEVEL: Beginner

CONTENT: Explain photosynthesis.



watsonx Agent 07:04 AM

Simplified Content for Beginner: Plants make their own food using sunlight. They take water from the soil and a gas called carbon dioxide from the air. Using sunlight, they turn these into sugar for energy and release oxygen. This is called photosynthesis.

► How did I get this answer?



# RESULT

Intermediate:



You 07:05 AM

LEVEL: Intermediate

CONTENT: Explain photosynthesis.



watsonx Agent 07:05 AM

## Simplified Content for Intermediate:

Photosynthesis is a process where plants, algae, and some bacteria convert light energy, usually from the sun, into chemical energy. This energy is stored in organic compounds like sugars, which the organisms use for their metabolism.

### Key Points:

1. **Light Energy Conversion:** Photosynthesis begins when light is absorbed by pigments like chlorophyll in plants.

2. **Oxygen Production:** In most plants, water is split, releasing oxygen as a byproduct. This is called oxygenic



# RESULT

## Intermediate:

1. **Light Energy Conversion:** Photosynthesis begins when light is absorbed by pigments like chlorophyll in plants.
2. **Oxygen Production:** In most plants, water is split, releasing oxygen as a byproduct. This is called oxygenic photosynthesis.
3. **Energy Storage:** The energy from light is used to produce molecules like ATP and NADPH, which are essential for energy processes.
4. **Carbon Fixation:** Carbon dioxide from the air is converted into sugars through a series of reactions called the Calvin cycle.
5. **Importance:** Photosynthesis is crucial for maintaining oxygen levels in the Earth's atmosphere and provides the energy needed for complex life.

### Additional Information:

- Some bacteria perform anoxygenic photosynthesis, which does not produce oxygen but uses other compounds like hydrogen sulfide.
- The first photosynthetic organisms likely used different sources of electrons, contributing to the oxygenation of the

# RESULT

Intermediate:

5. **Importance:** Photosynthesis is crucial for maintaining oxygen levels in the Earth's atmosphere and provides the energy needed for complex life.

## Additional Information:

- Some bacteria perform anoxygenic photosynthesis, which does not produce oxygen but uses other compounds like hydrogen sulfide.
- The first photosynthetic organisms likely used different sources of electrons, contributing to the oxygenation of the Earth and the evolution of complex life.

Photosynthesis is a fundamental process that supports life on Earth by converting light energy into chemical energy that organisms can use.

► How did I get this answer?



Type something...



# RESULT

Expert:



You 07:07 AM

LEVEL: Expert

CONTENT: Explain photosynthesis.



watsonx Agent 07:07 AM

## Simplified Content for Expert:

Photosynthesis is a complex biological process where photosynthetic organisms, such as plants, algae, and cyanobacteria, convert light energy into chemical energy. This energy is stored in organic compounds like sugars, starches, and cellulose, which are essential for metabolism.

## Key Points:

1. **Oxygenic Photosynthesis:** Most plants perform oxygenic photosynthesis, which produces oxygen as a byproduct. This

|type something...



# RESULT

Expert:

## Key Points:

1. **Oxygenic Photosynthesis:** Most plants perform oxygenic photosynthesis, which produces oxygen as a byproduct. This process is crucial for maintaining the Earth's oxygen levels and supports complex life.
2. **Anoxygenic Photosynthesis:** Some bacteria perform anoxygenic photosynthesis, using bacteriochlorophyll to split hydrogen sulfide instead of water, producing sulfur. Archaea like Halobacterium use retinal and microbial rhodopsin to absorb light and synthesize ATP directly.
3. **Light-Dependent Reactions:** The process begins with the absorption of light energy by reaction centers containing photosynthetic pigments like chlorophyll. In plants, these pigments are in chloroplasts. Energy is used to strip electrons from substances like water, producing oxygen and creating NADPH and ATP.
4. **Calvin Cycle:** In plants, algae, and cyanobacteria, sugars are synthesized through the Calvin cycle, a light-independent process. Carbon dioxide is incorporated into organic compounds using ATP and NADPH, forming carbohydrates like glucose.
5. **Evolutionary Significance:** Early photosynthetic organisms likely used hydrogen or hydrogen sulfide as electron sources. Cyanobacteria appeared later, contributing to the oxygenation of the Earth and enabling the evolution of complex life.

Type something...



# RESULT

Expert:

5. **Evolutionary Significance:** Early photosynthetic organisms likely used hydrogen or hydrogen sulfide as electron sources. Cyanobacteria appeared later, contributing to the oxygenation of the Earth and enabling the evolution of complex life.
6. **Global Impact:** Photosynthesis captures approximately 130 terawatts of energy globally, about eight times the total power consumption of human civilization. It converts around 100–115 billion tons of carbon into biomass annually.

## Historical Context:

- Photosynthesis was discovered in 1779 by Jan Ingenhousz, who demonstrated that plants need light, not just soil and water.

## References:

- For a detailed understanding, refer to sources on the evolution of photosynthesis and the Purple Earth hypothesis.

Photosynthesis is a fundamental process that supports life on Earth by converting light energy into chemical energy, which organisms use for their metabolism.

Type something...



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# CONCLUSION

- The Course Content Simplification Agent personalizes academic content delivery by adjusting its complexity according to the learner's needs. By using IBM Watsonx.ai with the Mistral model, the system makes content more accessible and supports diverse learning styles. It is a valuable educational tool for students, educators, and institutions.

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# FUTURE SCOPE

- File upload support for DOC/PDF
- Add audio output for visually impaired students
- Multilingual explanation generation
- LMS integration for teachers and schools
- Adaptive learning profiles per user

# REFERENCES

- IBM Watsonx.ai: <https://www.ibm.com/products/watsonx-ai>
- Mistral model: <https://mistral.ai>
- AICTE Internship Guidelines
- IBM SkillsBuild Courses



# IBM CERTIFICATIONS

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