

# DIGIEDUHACK SOLUTION CANVAS

**Title of the solution:** 
**Team name:** 
**Challenge addressed:** 
**Challenge category:** 
**Background of the team:**

(multiple selections possible in case of mixed teams)

 Higher Education Students

 Teachers

 Others (please specify) 
 Researchers

 Primary School Students

 Professionals

 Secondary School Students

## Solution description

What is the final product/service/tool/activity you're proposing? What are its main elements, technologies and objectives? Could you please include a brief implementation plan with some key overall milestones, resources required and eventual barriers foreseen?

How could your solution be used to enhance digital education nowadays? How could its success be measured?

The project proposes an **intelligent assistant for students**, capable of answering questions directly based on a PDF containing lessons or course materials. The system works through an automated workflow using **n8n**, **Pinecone** to store vectors, and **Google Gemini** to generate embeddings and produce responses. The goal is to help students quickly understand their course content by providing **accurate, contextualized, and level-appropriate answers**.

The project relies on the following components: a workflow that extracts text from the PDF, converts it into **vectors** (embeddings) that computers can understand, stores these vectors in **Pinecone**, and uses **RAG (Retrieval-Augmented Generation)** to answer questions. In this process, **Retrieval** searches for the most relevant passages in the PDF, and **Generation** creates a clear and readable answer based on these passages. A final cleaning script ensures that the response is easy to read for the student.

The implementation plan includes: setting up accounts and the environment, configuring the workflow to extract text from PDFs, generating and storing embeddings in Pinecone, setting up a chat trigger to receive questions, retrieving relevant passages from Pinecone, generating responses via Google Gemini, and cleaning the final text. Required resources include access to the APIs and services, as well as skills in automation and LLMs. Potential challenges include variable answer quality depending on the PDF, API limitations, and handling complex documents.

This project contributes to digital education by enabling **autonomous and interactive learning**, reducing the time needed to search through course materials, and providing an **intelligent assistant accessible at any time**. Success can be measured by the **accuracy and relevance of responses**, student satisfaction, response speed, adoption rate, and the precision of document retrieval.

## Context

What is the current or future problem you're trying to solve? How does your solution align with DigiEduHack 2024 annual theme?

How does your solution confront the challenge posed by the hackathon organiser and how does it address the challenge category?

**1. Current or Future Problem**  
Many students struggle to understand complex course materials or locate specific information in large PDF documents. They often spend hours searching through notes or textbooks to find answers to their questions, which slows down learning and reduces motivation. Additionally, not all students have **easy access to a teacher or tutor** to clarify doubts.

**Future problem:** As digital education grows, students will increasingly rely on **online resources** and PDFs for self-learning. Without tools to quickly extract knowledge and provide context-aware answers, students may face information overload and inefficient learning.

**2. Alignment with DigiEduHack 2024 Theme**  
DigiEduHack 2024 focuses on **innovative digital solutions to improve learning and accessibility in education**.

Our solution aligns perfectly because it enhances digital education by transforming static PDFs into **interactive learning experiences**.

Students can ask questions and receive personalized, context-aware answers, supporting **autonomous learning** and improving learning efficiency.

**3. Confronting the Hackathon Challenge**  
The hackathon challenge focuses on creating tools that improve access to knowledge and foster active learning in a digital environment.

Our solution addresses this by implementing a **Retrieval-Augmented Generation (RAG) system**:

Generates human-readable answers based on that content.

By doing so, it tackles the challenge category of **Digital Learning Enhancement**, providing a smart, AI-powered tutor that supports interactive, on-demand learning.

Problem → Students need fast, accurate answers from course materials.

Solution → AI assistant that reads PDFs and answers questions.

Hackathon alignment → Digital education innovation, improved accessibility, autonomous learning.

## Target group

Who is/are the target group/s of your solution and how will they benefit from it? Why is your solution relevant to them? How do you plan to engage these groups so you fully meet their specific needs?

The primary target group of our solution is **students at all levels** who use PDFs or digital course materials for learning. This includes: High school and university students. Lifelong learners or self-learners who study from online courses and e-books. Secondary groups include **teachers and educators**, who can use the tool to provide **instant support and guidance** to students.

**Benefits to the Target Group**  
Quick access to knowledge: Students can get precise answers directly from the PDF without manually searching through pages. Improved understanding: The AI explains concepts in clear, contextualized language suitable for the student's level. Autonomous learning: Learners can study at their own pace and clarify doubts instantly, anytime. Time-saving: Reduces the time spent looking for answers in lengthy documents. For teachers, it helps in supporting students efficiently, allowing them to focus on more complex guidance instead of repetitive questions.

**Relevance**  
The solution addresses a **real problem**: students struggle with dense, unstructured materials. It is particularly relevant in **digital education**, where PDFs and e-books are common, but guidance is not always available. By combining **RAG (Retrieval + Generation)** with AI embeddings, the solution ensures answers are **accurate and directly drawn from course content**, increasing trust and usability.

**Engagement Plan**  
Pilot programs: Introduce the assistant in selected classes or online courses to gather feedback. Interactive interface: Provide a **chat-based interface** where students can easily ask questions. Feedback loop: Collect feedback on answer clarity, relevance, and accuracy to continuously improve the system. Customization: Adjust language complexity and explanations based on student level (high school, university, self-learner). By actively involving students and educators in testing and feedback, the solution ensures it **meets their specific learning needs** and improves over time.

## Impact

How will your solution catalyse changes in education and what impacts will it have at social and environmental level? Could you provide examples or scenarios illustrating how such changes and impacts might unfold?

**Catalyzing Changes in Education**  
Our solution can transform the way students access and understand learning materials by turning static PDFs into an **interactive, AI-powered learning assistant**. Students no longer need to manually search through textbooks or notes; they can ask questions in natural language and get **contextualized answers** instantly. It promotes **autonomous, self-paced learning**, allowing students to take control of their education. Teachers can focus on **higher-level guidance** instead of repetitive explanations, enabling more **personalized instruction**.

**Social Impact**  
**Increased educational equity:** Students in remote or under-resourced areas can access AI assistance even without a tutor. **Enhanced learning outcomes:** Students understand materials faster and more thoroughly, reducing frustration and dropout risk. **Support for lifelong learning:** Adult learners or people taking online courses can benefit from the same personalized guidance as formal students.

**Example scenario:**  
A high school student struggling with biology can upload or reference a PDF of the textbook and ask, "What is photosynthesis?" The AI provides a clear answer using the textbook content. The student understands the concept faster, participates more confidently in class, and spends less time searching through the textbook.

**Environmental Impact**  
**Reduced paper usage:** By providing digital, interactive access to content, the need for printed summaries, notes, or extra textbooks is reduced.

**Lower carbon footprint of education:** Less travel to libraries or for tutoring sessions, thanks to **online AI support**.

**Example scenario:**  
Instead of printing multiple pages to understand a lesson, students interact with the PDF digitally. Schools can reduce paper consumption, contributing to sustainability goals.

**Overall Impact**

**Educational:** Smarter, faster, and more personalized learning.

**Social:** Greater equity, access, and empowerment for learners everywhere.

**Environmental:** Reduced paper use and energy costs linked to traditional learning resources.

## Describe it in a tweet

How would you describe your solution in a short catchy way with maximum 280 characters?

An AI-powered learning assistant that reads your course PDFs and answers questions instantly, helping students learn faster, understand better, and study smarter—anytime, anywhere."

## Innovativeness

What makes your solution different and original? Are there similar solutions or approaches currently available or implemented by education sector practitioners? If so, why and to what extent is your solution better?

**Our solution is PDF-centric and AI-powered**, meaning it directly uses the student's own course PDFs to generate answers. Unlike general chatbots, it provides **contextualized, level-adapted explanations**, turning static documents into an **interactive learning assistant**. The full workflow—from text extraction to vector storage and RAG-based question answering—is automated, ensuring reliable, precise, and on-demand support.

**Comparison with existing solutions**  
General AI takers (e.g., ChatGPT): Can answer questions, but may not refer to the student's own materials, leading to less relevant or generic answers.

PDF readers with search functions: Can locate keywords but cannot explain concepts in context.

Online learning platforms (Coursera, Khan Academy): Offer structured content, but cannot answer ad-hoc questions on **custom PDFs** uploaded by the student.

**Why our solution is better**  
Accuracy: Answers are drawn directly from the student's PDF.  
Time-saving: No need to manually search or cross-reference pages.  
Personalized learning: Adapts explanations to the student's level.  
Interactive and scalable: Turns static PDFs into a dynamic, AI-driven study tool.

## Transferability

Can your solution partly or fully be used in other education/learning contexts or disciplines? Could you provide any example?

Our solution can be **fully adapted to almost any discipline or learning context** where course materials are provided as digital documents, PDFs, or e-books. It is not limited to one subject because it relies on **retrieval from text** and **AI-generated explanations**, which can work with **any content**.

**Examples**  
**STEM subjects:** Physics, chemistry, or mathematics PDFs can be uploaded, and the AI can explain formulas, concepts, or problem-solving steps.  
**Humanities and social sciences:** History or literature PDFs can be used to answer questions about events, summaries, or text analysis.  
**Professional training / corporate learning:** Employees can upload manuals or guidelines, and the AI can answer questions on processes, regulations, or procedures.  
**Language learning:** Textbooks or grammar guides in any language can be used to answer questions, explain rules, or give examples.

## Sustainability

Once you have a prototype, what are your plans for a further development, implementation upscale and replication of the solution? How do you see it working in the mid- and long term?

Once the prototype is ready, we plan to improve accuracy, add multi-PDF support, and create a smoother chat interface. In the mid-term, the solution can be scaled into a web or mobile app and integrated into school platforms like Moodle or Google Classroom. Because it works with any PDF, it can easily be replicated across subjects and education levels. In the long term, it can evolve into a full AI tutor that understands whole curricula, provides personalized help, and supports millions of learners worldwide.

## Team work

Present the members of your team.

Why are you the perfect team to develop this work and what are the competencies you all bring in so the solution is developed successfully? What is your expertise within the thematic field concerned? Are you planning to continue working as a team in the future? If so, why?

Our team is composed of Marwa Ennor, Malak Kandil, and Osama El Atifi. Together, we bring a strong combination of technical curiosity, problem-solving skills, and a deep understanding of students' real learning needs. As active learners ourselves, we fully understand the difficulties students face when studying from long PDFs or complex lessons. This gives us a unique perspective for designing an AI assistant that truly helps students. Marwa contributes strong organizational skills and a clear vision of user experience. Malak brings creative, analytical thinking, and the ability to simplify complex ideas. Osama focuses on technical understanding, workflow logic, and ensuring that the solution meets real educational challenges. Our complementary strengths make us an effective and balanced team. We plan to continue working together because we share the same motivation: improving learning through innovation. Our collaboration is productive, our communication is strong, and we believe this project can evolve into a powerful tool that supports students everywhere.