| **Use Case Name**  *Give a short descriptive name for the use case to serve as a unique identifier. Consider goal-driven use case name.*  GPT Pedagogy — Mathesis |
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| **Goal**  *The goal briefly describes what the user intends to achieve with this use case.*  Develop a model, *Mathesis*, to maintain its conversational abilities while embedding additional knowledge about faculty defined key learning objectives, which will generate a series of topic-relevant questions, evaluate the answers of those questions, and give useful feedback or counterexamples to the student.  This model in the future will be able to be generalizable for other classes and disciplines. The model will work especially well for courses where it is difficult to give personalised feedback to each learner in each class meeting time. This often happens in classes that have a high student to faculty ratio. It will also work well for courses with students, interested in AI, who cannot adequately engage with that interest through the course material. |
| **Summary**  *Give a summary of the use case to capture the essence of the use case (no longer than a page). It provides a quick overview and includes the goal and principal actor.*  Students, without evil will of exploiting Mathesis beyond its normal usage, logs in and starts chatting with an agent that responds in real time with auto-generated questions. They proceed with their learning experience, discovered their weak spots of Biology knowledge, which leads to better overall learning outcomes; Professor, without evil will of exploiting Mathesis beyond its normal usage, logs in and starts viewing a chart crafted relating student responses to knowledge pinpoints, drawing unbiased conclusion from the chart and make necessary changes of pace for later lectures, which then improves the quality and consistency of lectures, leading to better teaching experience. |
| **Actors**  *List actors, people or things outside the system that either acts on the system (primary actors) or is acted on by the system (secondary actors). Primary actors are ones that invoke the use case and benefit from the result. Identify sensors, models, portals and relevant data resources. Identify the primary actor and briefly describe role.*  Students  Professor  RPI  Server  OpenAI |
| **Preconditions**  *Here we state any assumptions about the state of the system that must be met for the trigger (below) to initiate the use case. Any assumptions about other systems can also be stated here, for example, weather conditions. List all preconditions.*  The User has a valid RPI ID  The User is enrolled in the class either as the professor or student  The User is connected to the internet  The Server is running  OpenAI is accessible  DataBase is accessible |
| **Triggers**  *Here we describe in detail the event or events that brings about the execution of this use case. Triggers can be external, temporal, or internal. They can be single events or when a set of conditions are met, List all triggers and relationships.*    User had successfully sent a valid request using the browser with either search engines.  Users and Servers establish valid connections.  Users interact with the agent  Servers have received the requests and attempt to process them as described.  Servers call OpenAI API and get responses from the pretuned agent.  Server creates a response to be returned to the user  User receives the response from servers.  User interprets the response and ends the use case. |
| **Basic Flow**  *Often referred to as the primary scenario or course of events. In the basic flow we describe the flow that would be followed if the use case where to follow its main plot from start to end. Error states or alternate states that might be highlighted are not included here. This gives any browser of the document a quick view of how the system will work. Here the flow can be documented as a list, a conversation or as a story.(as much as required)*   1. the user logs in via his RPI account 2. server checks if the information matches and if the student is enrolled in the class or not 3. server create response to the user 4. users interprets the response and send request to the server 5. server interprets the result and send request to OpenAI API 6. OpenAI send request to the pretune agent and send response back to the server 7. server pushes response back to the user and the database 8. user interprets the response and terminates the use case 9. database record the response |
| ***Alternate Flow***  *Here we give any alternate flows that might occur. May include flows that involve error conditions. Or flows that fall outside of the basic flow.*   1. User authorized into Mathesis 2. User perform actions beyond normal usage 3. Mathesis detects malicious behavior 4. User interaction halted and actions are taken to either mitigate or terminate this incident. |
| **Post Conditions**  *Here we give any conditions that will be true of the state of the system after the use case has been completed.*  The student user, with the assistance of Mathesis, successfully learned/previewed the subject(in Biology) of the user's interest, then proceed with learning, discovered their weak spots of Biology knowledge, which leads to better overall learning outcomes. The professor draws unbiased conclusion from the relationship of students’ response to auto-generated questions and make respective changes of pace for later lectures, which then improves the quality and consistency of lectures, leading to better teaching experience. |
| ***Activity Diagram***  *Here a diagram is given to show the flow of events that surrounds the use case. It might be that text is a more useful way of describing the use case. However often a picture speaks a 1000 words.*    **Questions and Answers**  *Provide 2 questions that you will ask of the use case.*  *Show example answers to the two questions.*  *Describe at least one way you are using the semantics and/or provenance to propose an answer to the question.*  *Include an initial description of why the semantics and/or provenance representation and reasoning provides an advantage over other obvious approaches to the problem.*  What role does success of Intro to Biology course play in this use case?  The success of Mathesis in the Introduction to Biology course at RPI will serve as a stepping stone for its future integration into various other university courses.  How can faculty/professors draw conclusions from student responses?  Internally, key learning objectives are represented by JSON files. We store each lesson, the core concepts that the lesson aims to teach, and any questions that Mathesis generates based on those topics in those JSON files. |
| **Notes**  *There is always some piece of information that is required that has no other place to go. This is the place for that information.* |
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