Concept Note: AI for Education in Rwanda

1. Background

Artificial intelligence, and particularly Large Language Models, is creating new opportunities to improve access to educational support, strengthen teaching and learning, and provide more personalized learning experiences.

In Rwanda, the education system has made significant progress in expanding access to education and integrating digital technologies into teaching and learning. However, important challenges remain around access to high-quality learning support, availability of localized educational content, differences in learner ability, teacher workload, language of instruction, and access to educational resources outside the classroom.

Large Language Models can potentially support these challenges by providing interactive educational assistance to students, teachers, and other actors within the education system. These technologies can help learners ask questions, receive explanations, practice concepts, access additional learning materials, and interact with educational content in more flexible ways.

However, the usefulness of LLMs in education depends heavily on how they are designed and integrated into the learning environment. General-purpose AI systems may provide information that is not aligned with the national curriculum, may produce incorrect or inappropriate responses, and may fail to take into account the linguistic, pedagogical, and cultural context of learners.

This project therefore proposes the development of an **AI-powered education tool designed specifically to support the Rwandan education system**.

The tool will leverage existing Large Language Models and relevant educational resources to explore how AI can provide useful, reliable, accessible, and locally relevant educational support.

The initial project will run for **three months**, with the possibility of extension based on the results and opportunities identified during the first phase. This internship is paid and fully remote**.**

2. Project Objective

The overall objective of the project is to **design, develop, and evaluate an AI-powered education tool that uses Large Language Models to support teaching and learning within the Rwandan education system**.

The project will investigate how existing LLM capabilities can be adapted and integrated into a user-friendly application that responds to real educational needs.

Rather than developing or training a new foundation model, the project will focus on the practical application of existing AI technologies.

The central question of the project is:

How can Large Language Models be effectively and responsibly used to support learners and educators within the Rwandan education system?

3. Specific Objectives

The project will aim to:

1. Identify high-value educational use cases where Large Language Models can support learners, teachers, or other education stakeholders in Rwanda.
2. Develop a functional AI-powered educational application based on selected use cases.
3. Integrate relevant Rwandan educational content and curriculum-aligned resources into the application where appropriate.
4. Explore approaches for ensuring that AI-generated responses are accurate, relevant, understandable, and appropriate for the intended learner population.
5. Evaluate the ability of different LLMs and technical approaches to answer questions based on Rwandan educational materials.
6. Investigate how AI can support learning in multilingual environments, particularly across **Kinyarwanda and English**, and potentially French or other relevant languages where appropriate.
7. Develop an application that is simple and accessible to non-technical users.
8. Establish recommendations for the responsible adoption of LLM-based tools within the Rwandan education sector.

4. Scope of the Project

The project will focus primarily on the **application of Large Language Models within education**.

The work may investigate one or more educational use cases depending on feasibility and priorities identified at the beginning of the project.

Potential use cases include:

- AI tutoring for students;

- Question-and-answer support based on curriculum materials;
- Explanations of difficult concepts;
- Practice questions and exercises;
- Revision assistance;
- Support for homework and independent learning;
- Teacher assistance in preparing educational material;
- Lesson preparation support;
- Generation of exercises and assessments;
- Feedback on student responses;
- Language and literacy support;
- Personalized learning support; and
- Access to educational information through conversational interfaces.

The project will not attempt to address all possible applications simultaneously. A limited number of high-impact use cases will be prioritized to ensure that a functional and meaningful prototype can be developed within the project period.

5. Target Users

The project may support different actors within the education system.

The primary target groups may include:

Students

Students may use the system as an educational assistant that helps them understand concepts, ask questions, revise material, and practise what they have learned.

The application should complement classroom instruction rather than replace teachers.

Teachers

Teachers could use the tool to support activities such as lesson preparation, development of exercises, generation of examples, adaptation of explanations, and access to educational resources. Wherever appropriate, examples, explanations, exercises, and other learning materials would be adapted to the Rwandan context, using familiar situations, experiences, and references to make the content more relevant and easier for learners to understand.

Education Stakeholders

Depending on the selected use case, the system may also provide useful insights for curriculum specialists, education technology practitioners, content developers, and other actors involved in the education system.

The final target users will be clearly defined during the early stages of the project.

6. Curriculum and Local Context

A key principle of the project will be ensuring that the application is relevant to the **Rwandan education context**.

Where appropriate, the AI system will be grounded in approved or authoritative educational resources such as:

- Curriculum documents;
- Textbooks;
- Teacher guides;
- Learning materials;
- Educational guidelines; and
- Other relevant resources made available for the project.

The objective will be to reduce dependence on the general knowledge of an LLM and increase the likelihood that responses are consistent with the learning material expected within the Rwandan education system.

The project may therefore investigate techniques such as **Retrieval-Augmented Generation**, where the LLM is provided with relevant educational content before generating an answer.

This approach can allow the tool to provide responses that are more closely connected to approved educational materials without requiring the training of a new model.

7. Language Considerations

Language is an important component of educational access in Rwanda.

The project will therefore explore the ability of the system to support learners in languages relevant to the education system.

The initial priority will be:

1. **Kinyarwanda**
2. **English**

French may be considered where relevant and technically feasible.

The project will examine whether learners can ask questions in one language and receive appropriate explanations in the same or another language.

For example, a learner may encounter educational content in English but request an explanation in Kinyarwanda.

This could be particularly useful for helping learners understand difficult concepts while gradually developing proficiency in the language of instruction.

8. Technology Approach

The project will leverage existing Large Language Models rather than training a new foundation model.

A set of appropriate models and technical approaches will be evaluated based on factors including:

- Educational response quality;
- Ability to follow instructions;
- Multilingual capability;
- Support for Kinyarwanda;
- Accuracy;
- Reasoning ability;
- Context length;
- Deployment requirements;
- Cost;
- Latency; and
- Ease of integration.

The project may explore both cloud-hosted models and open models that can be deployed within controlled infrastructure.

Where relevant, the system may combine an LLM with:

- Retrieval-Augmented Generation;
- Structured educational databases;
- Search over curriculum materials;
- Question generation;
- Evaluation mechanisms; and
- Safety and content controls.

The emphasis will remain on creating an effective educational application rather than developing new foundation-model architectures.

9. User-Friendly Application

A central output of the project will be a **functional and user-friendly AI education application**.

Users should not need technical knowledge to interact with the system.

Depending on the selected use case, the application may allow users to:

- Ask educational questions;
- Select a subject or topic;
- Receive step-by-step explanations;
- Request simpler explanations;
- Generate practice questions;
- Receive hints;
- Review answers;
- Access relevant learning resources; and
- Interact in Kinyarwanda or English.

The interface should be designed around the needs of the intended users rather than around the underlying AI technology.

The project should therefore consider usability, clarity, accessibility, and age-appropriate interaction alongside technical performance.

10. Responsible Use of AI in Education

The project will pay particular attention to responsible and appropriate use of AI.

Educational applications require a higher standard of reliability because inaccurate explanations can negatively affect learning.

The project will therefore examine issues including:

- Hallucination and factual accuracy;
- Alignment with approved educational content;
- Age-appropriate responses;
- Bias;
- Privacy;
- Student dependence on AI-generated answers;
- Academic integrity;
- Explainability;
- Transparency that the user is interacting with an AI system; and
- Appropriate escalation when the system is uncertain.

Where possible, the application should encourage **learning and reasoning rather than simply providing final answers**.

For example, the tool may guide learners through questions, provide hints, explain mistakes, and encourage them to solve problems themselves.

11. Evaluation

The project will evaluate both the technical capabilities of the AI system and its usefulness as an educational tool.

Evaluation may include:

Educational Quality

Assessment of whether responses are:

- Correct;
- Relevant;
- Curriculum aligned;
- Clear;
- Age appropriate;
- Pedagogically useful; and
- Appropriate to the learner's level.

Language Quality

Evaluation of:

- Kinyarwanda quality;
- English quality;
- Translation where applicable;
- Clarity of explanations; and
- Appropriate educational terminology.

Technical Performance

Evaluation of:

- Response time;
- Reliability;
- Model performance;
- Retrieval quality;
- Cost of inference; and
- System scalability.

Usability

Evaluation of:

- Ease of use;
- Interface clarity;
- User understanding;
- Usefulness of responses; and
- Overall user experience.

Where appropriate, teachers or other education experts may participate in evaluating the quality of the application's responses.

12. Project Duration

The initial project duration will be **three months**.

The project will be designed as a focused prototype and evaluation phase.

A detailed implementation plan and schedule will be developed as one of the initial project outputs rather than predetermined within this concept note.

Based on the findings of the initial phase, the project may be extended for an additional period.

Potential areas for an extension may include:

- Expansion to additional subjects;
- Support for additional school levels;
- Improved Kinyarwanda functionality;
- Integration of voice technologies;
- Expanded teacher functionality;
- Broader user testing;
- Integration with existing education platforms;
- Mobile deployment;
- Offline or low-connectivity functionality; and
- Pilot deployment within selected schools or learning environments.

13. Expected Deliverables

The initial three-month project is expected to produce the following key deliverables:

1. **Needs and Use-Case Assessment**
   Identification and prioritisation of educational use cases that can realistically be supported using LLM technologies.
2. **Technical and Functional Requirements**
   Definition of the intended users, functionality, system requirements, educational requirements, and technical architecture.
3. **Detailed Project Workplan**
   A structured workplan describing activities, milestones, responsibilities, evaluation activities, and implementation timelines for the project.
4. **Educational Resource Assessment**
   Identification of relevant Rwandan curriculum materials and other educational resources required to support the selected use case.
5. **LLM Evaluation**
   Evaluation of selected Large Language Models for the educational tasks and languages relevant to the project.
6. **Functional AI Education Prototype**
   A user-friendly application demonstrating the selected educational use case.
7. **Curriculum-Grounded AI Capability**
   Where appropriate, integration of educational resources using mechanisms such as Retrieval-Augmented Generation.
8. **Evaluation Framework and Results**
   Documentation of the methodology used to assess educational quality, technical performance, language quality, and usability.
9. **Technical Documentation and Reusable Source Code**
   Documentation supporting continued development of the application.
10. **Final Project Report**

A report describing the methodology, results, challenges, lessons learned, limitations, and recommendations for further development.

11. **Recommendations for Scale-Up**

Recommendations on whether and how the system could be expanded, piloted, or integrated into the broader Rwandan education ecosystem.

14. Expected Outcomes

The project is expected to demonstrate how existing Large Language Models can be translated into practical tools that support the needs of the Rwandan education system.

The expected outcomes include:

- A better understanding of high-value applications of LLMs within education;

- Evidence regarding the strengths and limitations of current LLMs for Rwandan educational content;
- A functional prototype that can be demonstrated to education stakeholders;
- Improved understanding of how Kinyarwanda can be incorporated into AI-supported educational experiences;
- A framework for evaluating AI-generated educational content;
- Practical experience in grounding AI systems in curriculum resources;
- Recommendations for responsible AI adoption within education; and
- A foundation for a larger pilot or longer-term AI-for-education programme.

15. Strategic Importance

AI has the potential to substantially increase access to personalized educational assistance. However, the value of this technology will depend on whether it can be adapted to the realities of local education systems.

For Rwanda, the opportunity is not simply to provide students and teachers with access to general-purpose chatbots. The greater opportunity is to develop AI systems that understand the **curriculum, languages, learning objectives, and educational context** within which students and teachers operate.

This project will provide an opportunity to investigate how Large Language Models can be transformed from general-purpose technologies into practical educational tools aligned with national needs.

By focusing on application development, curriculum grounding, multilingual access, usability, and responsible deployment, the project can establish an initial foundation for a broader **AI for Education programme in Rwanda**.

The long-term objective is to contribute to an education ecosystem in which AI supports teachers, expands access to learning assistance, helps students better understand educational content, and makes high-quality educational support increasingly accessible regardless of a learner's location or circumstances.