Research Proposal Outline

Title:
AI-Powered Adaptive Learning System for Primary Students in Qatar: Generating Personalized Lesson Summaries and Remedial Plans Based on Performance and Attendance

1. Research Problem & Significance

Primary students in Qatar frequently face challenges in keeping up with lessons due to absenteeism or difficulties in specific learning areas. Teachers often spend excessive time manually identifying learning gaps and creating support plans. There is currently no centralised intelligent system that integrates attendance and performance data to offer timely, individualised interventions.

This research proposes an AI-driven system that automates the detection of at-risk students, generates age-appropriate summaries and quizzes, and recommends remedial actions—ultimately enhancing teaching efficiency and student outcomes.

2. Research Question

How can artificial intelligence be applied in Qatari primary schools to support personalised academic interventions by analysing student attendance and performance data?

3. Aims and Objectives

- To develop an AI-based support system tailored for primary school learners.

- To automatically generate summaries and short quizzes for students who are absent or underperforming.
- To detect performance drops and skill gaps through integrated analysis of attendance and test data.
- To create individualised remedial plans and assist teachers in pedagogical decisions.
- To evaluate the system's usability and educational impact in real-world school settings.

4. Key Literature Areas

- Adaptive learning technologies in early education.
- Generative AI for content creation for young learners.
- Ethical, cognitive, and pedagogical implications of AI in children's education.
- Data privacy and transparency in AI systems used in schools.

5. Methodology / Research Design

- **Approach:** Design Science Research (DSR).
- **Development:** Build a Python-based prototype integrating attendance logs, academic scores, and generative AI (e.g., GPT) for content generation.
- **Data:** Use synthetic or anonymised datasets from real educational environments.

- **Evaluation:** Conduct usability testing and qualitative feedback sessions with primary educators.

6. Ethical Considerations and Risks

- Anonymisation of all student data.
- Addressing concerns of algorithmic bias and explainability in AI.
- Ensuring educator control and transparency to avoid over-reliance on automation.
- Compliance with Qatar Ministry of Education standards and global data privacy frameworks (e.g., GDPR).

7. Artefact Description

The final deliverable will include:

- A teacher-facing dashboard with visual data insights.
- A skill-based analysis engine for academic performance.
- AI-generated, age-appropriate lesson summaries and quizzes.
- Automated alerts for learning gaps linked to attendance records.
- Remedial recommendations and suggested follow-ups for educators and parents.

8. Timeline (12 Weeks)

Weeks	Activities
1–2	Literature review, define problem, gather requirements.
3–5	Develop attendance and performance modules.
6–7	Integrate generative AI for summaries/quizzes.
8	Build and refine teacher dashboard.
9–10	Pilot testing and adjustments.
11	Final system testing and refinements.
12	Report writing and final presentation.