Project Title

Development of Educational Game for the Qatari Curriculum: A Systems Process Engineering Approach to Intelligent Learning Design

Project Description:

Background and Motivation

The digitization of educational curricula through interactive, game-based learning presents multidisciplinary challenges at the intersection of educational technology, human-computer interaction, and systems engineering. This project addresses the need for engaging, culturally aligned educational tools by developing HTML5 educational games tailored to the Qatari curriculum.

The focus is on designing structured, adaptive, and explainable digital learning systems while applying rigorous process engineering methodologies to optimize the curriculum digitization lifecycle. The project emphasizes systematic workflow modeling, bottleneck identification, and scalable implementation strategies.

Research Questions

How can intelligent content generation and adaptive mechanisms be designed to produce culturally and pedagogically appropriate educational game content aligned with the Qatari curriculum?

What systems process engineering methodologies (IDEF, Lean, Agile) can effectively identify and resolve bottlenecks in curriculum digitization workflows?

How can transparency and explainability be embedded into adaptive educational systems to build trust among educators and learners?

Alignment with International AI & Educational Technology Research Themes

This project engages with contemporary themes in intelligent systems and educational technology research:

Explainability in Intelligent Systems – Investigating how adaptive educational mechanisms can be made transparent and interpretable for educators and students

Human–AI Interaction and Human-Centered Design – Exploring collaborative workflows between developers and intelligent tools in educational content creation

AI Applications in Education – Educational technology as a high-impact applied domain

Adaptive Systems and Learning Personalization – Designing efficient and scalable adaptive mechanisms

Safety, Cultural Alignment, and Responsible AI – Ensuring age-appropriate, culturally aligned content consistent with Qatari values

Methodology

The project applies **systems process engineering principles**, including:

IDEF (Integrated Definition) function modeling

Root cause and bottleneck analysis

Interns will:

Model the current curriculum digitization workflow

Identify inefficiencies and structural bottlenecks

Design optimized future-state process models

Develop functional prototypes aligned with structured workflow improvements

The methodology integrates engineering rigor with iterative software development to ensure scalability, reproducibility, and measurable improvement.

Expected Contributions

A reproducible framework for AI-assisted educational game development
IDEF process models documenting optimized curriculum digitization workflows
Open-source HTML5 educational game prototypes
Empirical findings on bottleneck identification and workflow optimization
A case study on intelligent system integration in curriculum digitization
Documentation of explainability strategies in adaptive learning systems

Project Type: Research or Engineering

Research (with Engineering Components)

This project is positioned as applied research that may lead to submission to international conferences in artificial intelligence, educational technology, human-computer interaction, or intelligent systems.
The research contribution focuses on:

- Systems engineering framework
- Adaptive design methodology
- Empirical workflow optimization findings

The engineering component delivers working prototypes and structured documentation.

Internship Batch:

Batch 1: May 10 to July 9, suitable for Education City students, i.e., CMUQ, TAMUQ and HBKU students
Batch 2: May 31 to July 23, suitable for QU university students

Duties/Activities:

Research & Analysis

Conduct literature review on:

- Intelligent tutoring systems
- Educational game design
- Explainable adaptive systems
- Curriculum digitization frameworks

Map and analyze curriculum digitization workflows
Perform bottleneck and root cause analysis
Develop IDEF models for current and optimized processes
Define measurable performance indicators (KPIs) for workflow efficiency

Development & Implementation

Design and implement HTML5 games aligned with Qatari curriculum standards
Develop structured content generation pipelines
Implement adaptive learning features based on student performance metrics
Design transparent feedback mechanisms within games
Apply iterative Agile cycles to refine prototypes
Integrate process improvements into the development lifecycle

Documentation & Dissemination

Document:

- System architecture
- Workflow models
- Design decisions
- Testing results

Prepare structured research outputs, including:

- Abstract
- Introduction
- Methodology
- Results
- Limitations
- Ethical considerations

Conduct usability testing and analyze findings
Present final deliverables to mentors and stakeholders
Prepare a structured research manuscript suitable for international submission

Required Skills:
Basic proficiency in HTML, CSS, JavaScript
Understanding of programming logic
Interest in educational technology and intelligent systems
Analytical thinking and structured problem-solving
Basic familiarity with research methodologies
Attention to detail
Team collaboration skills
Strong written and verbal communication skills
Ability to work collaboratively in a team environment
Willingness to learn systems process engineering concepts (no prior experience required)
Preferred Intern Academic Level:
Sophomore, Junior, or Senior students in:
Computer Science
Computer Engineering
Information Technology
Systems Engineering
Educational Technology
Human-Computer Interaction
Or related interdisciplinary fields
Learning Opportunities:
Full-cycle research experience
Systems process engineering (IDEF, Lean, Agile)
Workflow modeling and optimization
Bottleneck analysis in complex digitization projects
Adaptive learning system design
Explainability in intelligent systems
Technical prototyping with web technologies
Academic writing and structured research dissemination
Exposure to peer-review standards
Portfolio development with research-grade outputs
Professional networking within Qatar's research ecosystem
Expected Team Size: *unlimited*

Mentors
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