Project Title

Digital Game-Based Learning for Qatari Curriculum: A Systems Process Engineering Approach to Educational Technology Development

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.

Objectives

Develop HTML5-based educational games aligned with specific Qatari curriculum learning objectives across multiple subject areas

Apply systems process engineering methodologies, including IDEF function modeling, to analyze and optimize curriculum digitization workflows

Identify bottlenecks in the game development and content adaptation process and implement structured solutions

Create reproducible frameworks for educational game development that can be scaled across different grade levels and subjects

Methodology

The project integrates educational technology development with systems process engineering principles to ensure both pedagogical effectiveness and operational efficiency. Interns will:

Analyze curriculum requirements and map them to game mechanics and learning outcomes

Develop IDEF (Integrated Definition) function models to document current and optimized workflows

Identify bottlenecks in the digitization process—including content adaptation challenges, technical limitations, and workflow inefficiencies

Apply process improvement techniques to overcome identified bottlenecks

Build functional HTML5 game prototypes that demonstrate the digitized curriculum content

Expected Outcomes

A set of HTML5 educational game prototypes aligned with Qatari curriculum standards

IDEF process models documenting optimized curriculum digitization workflows

A bottleneck analysis framework applicable to educational technology projects

Documentation of process improvement techniques and their impact on development efficiency

A case study on systems process engineering applied to curriculum digitization

Project Type: Research or Engineering

Research (with Engineering Components)

The project can be tailored toward either a research focus (emphasizing process analysis and methodology development) or an engineering focus (emphasizing game development and technical implementation), depending on intern interests and mentor guidance.

This project is positioned as applied research that may lead to submission to international conferences.

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:

Process Analysis & Modeling

Conduct a review of existing educational technology approaches and game-based learning methodologies.

Analyze Qatari curriculum requirements and identify opportunities for digitization through games.

Utilize systems process engineering methodologies to map current and future state workflows.

Develop IDEF (Integrated Definition) function models documenting the game development and content adaptation process.

Identify bottlenecks in curriculum digitization processes—such as content adaptation challenges, technical limitations, or workflow inefficiencies—using structured root cause analysis.

Apply process improvement techniques (Lean, Agile, or Kaizen principles) to overcome identified bottlenecks.

Game Development

Design and develop HTML5 games aligned with Qatari curriculum objectives.

Write, test, and debug programming scripts for game mechanics and user interactions.

Implement interactive features that engage students and reinforce learning objectives.

Ensure games are accessible, culturally appropriate, and pedagogically sound.

Test game functionality and user experience, iterating based on feedback.

Documentation & Dissemination

Document all development processes, challenges encountered, and solutions implemented

Prepare structured reports on process improvements and their impact on development efficiency

Create user guides and technical documentation for the games developed

Present progress updates and final deliverables to mentors and stakeholders

Prepare a comprehensive project report suitable for academic or professional dissemination

Required Skills:

Basic proficiency in HTML, CSS, and JavaScript

Fundamental understanding of programming logic and scripting

Interest in educational technology and game-based learning

Analytical thinking skills for process analysis and bottleneck identification

Problem-solving mindset with attention to detail, 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 standing in Computer Science, Computer Engineering, Information Technology, or related fields. Students with interdisciplinary interests in Educational Technology, Systems Engineering, Industrial Engineering, or Process Improvement are strongly encouraged to apply.

Learning Opportunities:

Game Development: Hands-on experience in full-cycle educational game development from concept to deployment using HTML, CSS, and JavaScript

Systems Process Engineering: Foundational knowledge of systems process engineering principles and hands-on experience creating IDEF function models

Bottleneck Analysis: Practical experience identifying bottlenecks in complex digitization projects using structured analysis techniques

Process Improvement: Understanding process improvement techniques such as Lean, Agile, or Kaizen methodologies applied to educational technology

Curriculum Digitization: Exposure to Qatari curriculum requirements and the challenges of translating educational content into digital formats

Technical Documentation: Experience creating comprehensive documentation for both technical and non-technical audiences

Project Management: Training in basic project management tools and methodologies for tracking progress and coordinating team efforts

Portfolio Development: Portfolio-worthy projects demonstrating game development capabilities and process modeling skills

Professional Networking: Connection with mentors and peers in Education City's research and educational technology ecosystem

Expected Team Size

2-4 interns working collaboratively, with opportunities for peer learning and distributed responsibilities based on individual strengths. Team members can specialize in different areas (game development, process modeling, curriculum analysis) while contributing to the integrated project outcomes.

Mentors

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