UGANDA CHRISTIAN UNIVERSITY

A Center of Excellence in the Heart of Africa

FACULTY OF ENGINEERING, DESIGN AND TECHNOLOGY
DEPARTMENT OF COMPUTING AND TECHNOLOGY

OBJECT ORIENTED PROGRAMMING PROJECT PROPOSAL

MSc. DATA SCIENCE & ANALYTICS

OBJECT ORIENTED FRAMEWORK FOR UGANDA'S COMPETENCE BASED CURRICULUM (CBC) GRADING SYSTEM.

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I. Strategic Rationale: Digitizing the CBC assessment landscape

The introduction of the Competence-Based Curriculum (CBC) in Uganda aims to transform the traditional system of rote memorization into one emphasizing skills, creativity, and practical learning. However, the reform faces challenges in assessment consistency across schools, particularly in three areas:

1. **Teacher assessment proficiency:** Research indicates that a large proportion of teachers have limited proficiency in designing and implementing CBC-aligned formative assessment practices, such as rubrics. This results in inconsistencies in data used for Continuous Assessment (CA).

2. **Standardization of assessment:** Assessment materials and guidelines vary widely in quality and structure, reducing comparability of results across schools.

3. **Transparency of reporting:** Parents struggle to interpret CBC assessment reports, as they are competency-based rather than percentage-based. Consequently, understanding skill mastery levels becomes difficult.

Problem statement

Uganda's Competence-Based Curriculum (CBC) was introduced to emphasize creativity, skills, and practical learning over rote memorization. However, its implementation faces a major challenge in **grading consistency and transparency**. Teachers often interpret rubrics differently, leading to varied Continuous Assessment (CA) scores. Parents and learners also find it difficult to interpret the new competency-based reports, as grades are not expressed in traditional percentage terms. This proposal aims to design a Python-based grading framework that ensures standardized computation and reporting of student performance in alignment with CBC assessment guidelines.

Relevance

A digital solution for CBC grading is crucial for promoting fair and comparable assessment outcomes across schools. The proposed system will help teachers accurately capture student performance on learning outcomes, apply the Ministry of Education's official weighting (20% CA and 80% exam), and generate transparent reports for parents and administrators. By embedding assessment policies into code, this project supports Uganda's broader agenda of digitizing education and strengthening data-driven evaluation in schools.

Scope of the project

The project focuses on designing and prototyping a python based **Competency engine** that automates CBC grade computation. The system will:

i) Accept teacher-entered competency scores on a 1–3 scale ("Some," "Most," "All").

ii) Convert qualitative assessments to quantitative CA marks.

iii) Combine CA (20%) with exam results (80%) to produce final grades (A–E).

iv) Generate printable student reports showing both academic and non-academic performance.

The project will not include large-scale deployment or integration with national databases; the focus is a working prototype demonstrating Object-Oriented Programming principles.

III. Proposed python implementation

The framework will be implemented using **Object-Oriented Programming (OOP)** principles, ensuring modularity, reusability, and scalability. Key design components include:

A. Core class definitions

Object Class	Role in CBC Grading System	Key Functionality / Challenge Addressed
Competency	Represents a measurable Learning Outcome (LO) or skill (e.g., Problem Solving, Collaboration).	`check_Mastery(LearnerID)` tracks achievement on a 1–3 scale. Focuses on skills rather than rote memory.
Rubric	Digital representation of standardized scoring guide linked to a competency.	`validate_against_CBC_Standard()` ensures uniform scoring across schools. Solves inconsistency in assessment design.
AssessmentTask	Represents a specific task (e.g., project, quiz, practical). Composed of multiple competency observations.	Ensures that complex, multi-skill tasks contribute meaningfully to the 20% CA score.
Competency Observation	Atomic data point: teacher's score (1–3) per learner per competency.	`normalize_Score()` converts qualitative scores to numerical values for aggregation and ensures integrity of calculations.
FinalGrade	Encapsulation hub for calculating and reporting final grade.	`determine_FinalGrade()` enforces the 20% CA + 80% Exam rule and maps numeric output to letter grades.

Conclusion

This project will demonstrate the power of Python's Object-Oriented features in addressing real-world education challenges. The proposed framework will provide a practical tool for schools to standardize CBC grading, reduce teacher workload, and improve clarity in reporting learner achievement. Ultimately, it contributes to Uganda's digital transformation in education and evidence-based assessment practices.

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