CTL Mini-Grant Winners 2025-2026

Dear Colleagues,

Interest in the CTL's Mini-Grants 2025-2026 has been extraordinary, with many proposals submitted by our faculty from all three colleges.

We are pleased to announce the selected proposals through a competitive evaluation process.

The faculty members' names, designations, departments, colleges, and proposal titles are listed below.

Faculty Name	Designation | Department | College	Proposal Title
Nesma Talat Khalil	Senior Lecturer, Mathematics, College of Computing and Mathematical Sciences	Transforming Feedback and Learning Through AI-Supported.

<table>
<tr><th rowspan="2">Name of Recipient</th><th rowspan="2">Your KU ID No.</th><th colspan="2">Feedback on Your Proposal</th></tr>
<tr><th>Reviewer 1</th><th>Reviewer 2</th></tr>
<tr><td>Nesma Talat Sudqi Khalil</td><td>Ku1240</td><td>This Mini Grant project is highly organized, research-driven, and strongly aligned with CTL priorities in AI-enhanced teaching, formative assessment, and High-Impact Practices. It addresses a long-standing challenge in large mathematics courses: delivering prompt, high-quality feedback to students. The project offers a well-supported, practical solution using AI-enabled feedback analytics, grounded in a successful pilot and informed by international best practices. The implementation plan is clear and realistic, with measurable indicators such as faster grading turnaround, improved learning outcomes, and greater scoring consistency among instructors. Pedagogically, it redefines assessment as an ongoing learning process that incorporates activities like error clinics and peer discussions to promote reflection and deeper understanding.

Overall, this is a rigorous and scalable proposal that uses existing university resources efficiently and supports long-term adoption through shared rubrics and instructional guides. The only areas that could be strengthened are a clearer plan for ongoing instructor training and calibration across multiple sections and a strategy to maintain faculty engagement after the initial phase. These are minor points within an otherwise excellent project that models effective and responsible integration of AI into teaching and learning.

Clarifying questions:
1. How will faculty training and calibration be sustained in future semesters to maintain consistency in interpreting AI analytics?
2. Will the project include a method for gathering student feedback on the usefulness and fairness of AI-generated responses?
3. How will the reliability of key successful measures, such as efficiency gains and learning improvements, be verified across different instructors and course sections?</td><td>This proposal builds on an existing pilot that used Gradescope's AI-enhanced analytics to cluster student responses, identify recurring conceptual errors, and accelerate grading. Dr. Khalil aims to expand this approach to multiple sections of Calculus II, using time saved through automation to create targeted feedback sessions, peer explanations, and error clinics. Sustainability depends on continued Gradescope access. This is a research-informed proposal that demonstrates clear value and responsible AI integration. It effectively shows how AI can enhance assessment quality, consistency, and feedback timeliness without compromising instructor oversight.

To strengthen the proposal further, it would benefit from:

Including a sustainability plan confirming continued access to Gradescope or outlining low-cost alternatives.
Clarifying how faculty calibration and training will be supported long-term to maintain consistency across sections.</td></tr>
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Center for Teaching and Learning (CTL)

Mini-Grant Proposal 2025–2026

Transforming Feedback and Learning Through AI-Supported Assessment

Applicant: Nesma Talat Sudqi Khalil

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Department of Mathematics

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1. Themes Covered

AI-Enhanced Teaching and Learning; High-Impact Practices (HIPs)

This project integrates AI-supported formative assessment tools with evidence-based high-impact practices to enhance teaching effectiveness and deepen student learning. AI-enabled analytics, delivered through the Gradescope platform, streamline the feedback cycle, enabling timely, data-driven, and equitable feedback while maintaining full instructor oversight.

Time and cognitive bandwidth gained from reduced repetitive grading are reinvested in active learning strategies such as additional problem-solving sessions and targeted reteaching where students articulate and justify their reasoning, targeted error clinics, and structured peer explanations. These practices reinforce conceptual understanding, foster metacognition, and promote reflective learning, directly aligning closely with program goals in mathematical reasoning, communication, and professional competence.

2. Courses/Programs Involved

This project will be implemented in Calculus II (MATH 112) and is designed for scalability to other disciplines where written problem-solving and conceptual reasoning are assessed.

3. Abstract

Effective feedback is one of the most powerful influences on student learning, yet it remains one of the most time-consuming challenges in large classes. This project addresses that challenge by deploying AI-enhanced feedback analytics via Gradescope to improve the quality, timeliness, and pedagogical value of assessment.

- A successful Spring 2024–25 pilot demonstrated a 30% reduction in grading turnaround time and improved feedback consistency.
- The system clusters similar student solutions, revealing recurring conceptual gaps.
- Time gained is reinvested in targeted instructional adjustments and High-Impact Practices (HIPs) such as error clinics and peer-driven analysis.

The project aims to establish a sustainable, research-informed framework for AI-enhanced formative assessment—promoting deeper engagement, reflective learning, and data-driven course improvement.

4. Benchmarking & Best Practices

The proposed project is grounded in a robust body of international research demonstrating that AI-assisted formative assessment can significantly enhance feedback quality, efficiency, and instructional impact when implemented with intentional pedagogy and sustained human oversight. Rather than automating evaluation, these approaches position AI as a powerful analytical partner; one that augments instructor expertise, deepens feedback literacy, and strengthens student engagement with the learning process.

- **Evidence-Based Foundations**

Recent studies provide compelling evidence that the integration of AI-enabled feedback tools transforms the formative assessment landscape. Ba et al. (2025) and Deepshikha (2025) show that AI-supported systems improve the timeliness and diagnostic value of feedback while simultaneously personalizing responses by clustering common error patterns. These enhancements, however, depend on instructors maintaining a central interpretive role, ensuring that AI outputs inform, but do not replace academic judgment.

This principle is echoed by Memarian and Doleck (2024), who highlight the potential of AI to support instructor reflection and student metacognition by identifying recurring misconceptions and guiding targeted reteaching. Weidlich et al. (2025) further emphasize the importance of transparency and human oversight in shaping students' trust and perceptions of AI-generated feedback. When students understand that AI operates as a supportive analytic layer rather than a decision-maker, they are more likely to engage with feedback constructively.

Empirical case studies further illustrate these benefits in institutional contexts. Hansel et al. (2024) document how Gradescope substantially reduced grading time and improved feedback consistency in large lecture courses at Indiana University, contributing to measurable improvements in student outcomes, including reduced DFW rates. Similarly, Meinel et al. (2024) demonstrate that AI-enabled analytics enhance cross-grader consistency and adaptive instruction in online higher education environments. Finally, Labib and ElSabry (2025) underscore that sustainable adoption of AI tools is contingent on ongoing faculty development, reinforcing the principle that technology should extend rather than diminish pedagogical expertise.

- **Translating Best Practices into Project Design**

This project builds directly on these global best practices by embedding research-informed principles into every stage of implementation. AI-driven analytics will be deployed not as autonomous evaluators but as diagnostic companions that help faculty deliver more timely, equitable, and actionable feedback. The following table summarizes how key research insights map onto concrete design choices within the project:

Study / Source	Key Finding	Application in This Project
Ba et al. (2025)	AI improves feedback timeliness and diagnostic value when instructors remain central.	Faculty review AI-generated clusters before applying feedback; AI informs but never replaces academic judgment.
Deepshikha (2025)	Linking feedback to common errors enhances personalization and fairness.	Gradescope clusters responses for consistent, equitable, rubric-aligned feedback.
Memarian & Doleck (2024)	AI supports instructor reflection and student metacognition.	Analytics guide reteaching and curriculum adjustments; feedback supports student reflection.
Weidlich et al. (2025)	Transparency and faculty oversight shape student trust.	Students are explicitly informed of AI's supportive, non-decisional role.
Hansel et al. (2024)	Gradescope reduces grading time and improves consistency.	The project scales across multiple sections to validate broader impacts on learning outcomes.
Meinel et al. (2024)	AI improves cross-grader consistency and supports adaptive instruction.	Faculty calibration processes ensure quality and alignment across multiple graders and sections.
Labib & ElSabry (2025)	Sustainable AI use depends on faculty development.	Implementation includes structured onboarding, training, and shared instructional resources.

- **Guiding Principles**

Three interrelated principles derived from this literature underpin the project's design:

I. **Human-in-the-Loop Feedback:** Faculty remain central to interpreting AI analytics, ensuring that technology enhances rather than substitutes for pedagogical decision-making.

II. **Rubric-Driven Transparency:** AI outputs are anchored in clear, standards-aligned rubrics, supporting both fairness and student understanding of assessment criteria.

III. **Pedagogical Intentionality:** AI integration is deliberately aligned with instructional goals, faculty development initiatives, and opportunities for student reflection.

5. Project Description

5.1 Significance and Rationale

In Calculus II, students must produce detailed written solutions demonstrating reasoning and results. With high enrollments, sustaining timely, individualized feedback is challenging without compromising quality. The Gradescope platform, already KU licensed, leverages AI-supported clustering of responses, making recurring misconceptions visible—patterns often obscured in traditional workflows. This reframes assessment as a diagnostic, formative process, enabling timely instructional adjustments.

5.2 Implementation Plan

The successful pilot demonstrated efficacy in one section. The continuation expands this model to additional sections, addressing the core limitation of grading consistency and efficiency across multiple instructors and scaling the workflow.

- Phase 1 (Weeks 1–5): Rubric refinement; calibration among instructors across sections; onboarding of student upload workflow.
- Phase 2 (Weeks 6–10): Expanded data collection; formative analytics to inform in-class mini-lessons, error clinics, and peer explanations.
- Phase 3 (Weeks 11–15): Evaluation and reflections.

5.3 Pedagogical Significance

This workflow reframes assessment as a continuous learning process. Students benefit from immediate, actionable feedback and understand where they need to improve, while instructors gain insight into class-wide trends. This enables more targeted instruction, focused revision sessions, and earlier interventions, ultimately improving student learning outcomes and retention.

5.4 Workflow and Feasibility

To streamline workload and address time concerns, three options are planned for managing submissions: (1) instructor/TA assisted scanning for high-stakes exams, (2) student self-upload via the Gradescope portal for quizzes, and (3) hybrid models. AI assisted grouping accelerates review and supports consistent rubric application, but manual validation by faculty is maintained for open-ended tasks.

5.5 Alignment of Learning Outcomes, Assessments, and Feedback Activities

Program Learning Outcomes	Course Learning Outcomes	Assessments	Learning Activities
Apply mathematical reasoning and communicate solutions.	Use integration techniques, analyze series, differentiate parametric curves.	Quizzes and midterm items requiring written justification.	Cluster informed revision lessons, error clinics, peer discussion, focused practice.
Model and analyze processes using calculus.	Interpret results and justify method choices.	Short response items and written solutions.	Rubric-guided feedback prompts and feedback-based reteaching.
Engage in ethical and effective professional practice.	Reflect on errors and respond to feedback to improve solutions.	Revision tasks and targeted follow up problems.	Guided reflection using comment banks and iterative problem-solving.

5.6 Integration with Existing Systems and Practices

The workflow uses the Gradescope platform, with results uploaded to Blackboard for record keeping and student access. Insights guide tutoring referrals, structured office hours, and cross-section alignment. Artifacts, including comment banks, exemplar responses, and a short implementation guide, will be shared through departmental channels and CTL faculty development sessions.

6. Project Assessment Methods

6.1 Quantitative Metrics (Key Performance Indicators - KPIs):

Metric	Target	Purpose
Grading Time Reduction	≥30% reduction in average grading turnaround time.	Measures efficiency gained from AI clustering.
Learning Impact	≥20% improvement on targeted outcomes after reteaching.	Measures the effectiveness of timely, targeted interventions.
Conceptual Error Reduction	Documentable reduction in repeated conceptual errors across sequential assessments.	Measures student retention and transfer of corrected knowledge.
Inter-rater Consistency	Inter-rater reliability of ≥0.85 when multiple graders are involved.	Measures consistency and fairness across sections.

6.2 Qualitative Evidence:

- Sample Analytics Outputs: Screenshots and documentation highlighting the misconceptions identified by AI clustering that were previously obscured.
- Feedback Examples & Reflections: Representative examples of the enhanced feedback provided and concise instructor reflections on teaching adjustments informed by the analytics.

- Documentation: Documentation of teaching adjustments, such as the creation of cluster-informed mini-lessons or error clinics.

6.3 Sustainability & Scalability

Sustainability is secured through the creation of shared rubrics, comment banks, and implementation guides to support long-term adoption and expansion to related courses. The project uses Gradescope, a KU-licensed platform, ensuring no extra subscription costs are necessary for sustained use beyond the grant period.

7. Institutional Impact

The project positions the university as a leader in human-centered AI for formative assessment. Scaling the workflow across core courses will allow for coordinated feedback practices, data-driven curriculum refinement, and enhanced learning outcomes for hundreds of students annually. Results will inform institutional teaching strategies, curriculum reviews, and accreditation processes.

8. Applicants' Experience & Motivation

Over more than 25 years of teaching mathematics in higher education institutions across the UAE and Canada, I have seen one truth remain constant: students learn best when feedback arrives quickly enough to shape their next attempt. Across countless classrooms and diverse student groups, I have witnessed how even the most capable learners can become discouraged when meaningful guidance comes too late and how timely, targeted feedback can completely change their trajectory.

This project grows directly out of those decades of classroom experience. It is designed to transform assessment from a one-way judgment into a continuous learning dialogue, where patterns in student thinking are visible sooner, where feedback connects directly to next steps, and where instructional decisions are informed by real evidence rather than assumptions. By integrating AI tools into this process, I aim to amplify what matters most: the human side of teaching, including precision, responsiveness, and meaningful support for every learner.

My commitment to this work is deeply rooted in experience: I believe every student deserves feedback that is both immediate and actionable, and this project is how I intend to make that belief a consistent reality across our mathematics curriculum.

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