



STEVENS
INSTITUTE of TECHNOLOGY
THE INNOVATION UNIVERSITY

Re-Engineering Freshman Calculus in Response to Assessment

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Outline of ABET Presentation

Excerpts are provided here and the full presentation is available upon request.

1. Background - assessment reveals the calculus problem
2. Goals in addressing the problem
3. Approach
4. Methods
5. The Stevens Calculus System
6. Gradarius
7. The system and the team
8. Results

The Approach:

Lectures and Self-Study Projects (flipped classroom)

Before each lecture students need to complete a self-study project consisting of

- a reading assignment,
- related videos,
- a Gradarius exercise and quiz.

During lectures

- complemented traditional lecture,
- there are one or two clicker sessions addressing main concepts and common mistakes.

Workshops and Homework

Workshops (model-eliciting techniques)

- are collaborative and open-book, hands-on, open-ended problem solving sessions,
- are done with Gradarius in tutor mode.

Homework

- problems are related to workshop problems,
- are done in Gradarius in exam mode,
- indefinite number of attempts allowed.



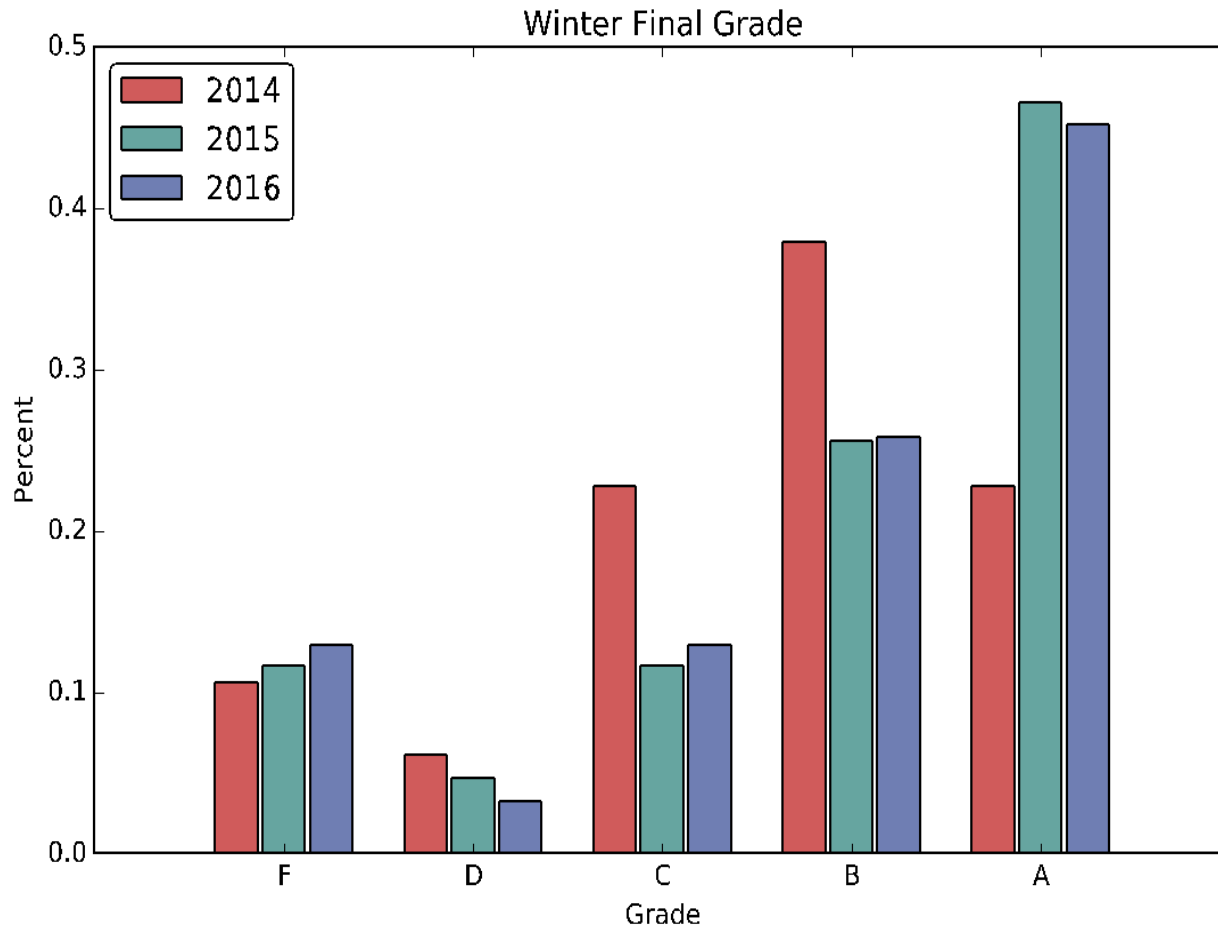
....is an intelligent automated Calculus tutor.

- which allows students to enter complete solutions as they would on paper without any restrictions (not just final answers),
- checks all steps of entered solutions and recognizes mistakes,
- provides immediate and comprehensive feedback for each step,
- grades entered solutions and gives partial credit,
- provides real time analytics and reports for each problem.

Evaluation of Effectiveness of the System

Winter intersessions give the cleanest test of the effectiveness of our calculus teaching system:

1. The same instructor is teaching
2. The whole system was introduced at once
3. The students here are those who did not pass Calculus 1 in the fall



*Note: Gradarius introduced to Stevens calculus classrooms in 2015.

For Additional Information

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We welcome your thoughts and comments.