Combating AI-Assisted Academic Dishonesty: An Integrated Homework–Video–Reflection Framework

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MAA Southeastern Section Annual Meeting
March 28, 2026

The "AI Homework, Failed Exam" Problem

A troubling pattern in mathematics classrooms

Students who achieve perfect homework scores but fail their exams.

Why it happens:

- AI tools (ChatGPT, etc.) generate polished solutions in seconds
- Students submit AI work without engaging with the material
- Traditional grading cannot distinguish genuine effort from AI output

What doesn't work:

- Banning AI tools — easy access outside class makes this unenforceable
- Punitive detection — adversarial, unsustainable, inequitable

The shift needed

From *catching* misuse $\longrightarrow$ to *eliminating the incentive* for misuse.

Eight Interconnected Problems, One System

By end of Fall 2023, the following had reached critical levels:

Academic integrity

1. AI-assisted homework violations
2. Exam performance disconnect

Instructor burden

3. Excessive grading time
4. Wasted class time on exam review

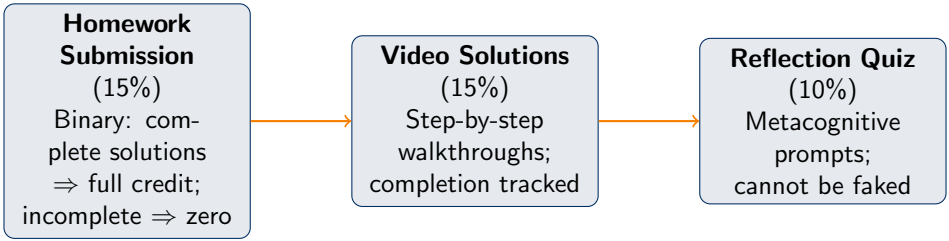
Student experience

5. Insufficient worked examples in class
6. Lack of detailed feedback
7. Exam unpredictability complaints
8. Need for repeatable self-paced review

Key insight

These problems are interconnected. A piecemeal fix for one worsens another. The solution must be **integrated**.

The Three-Component System



Homework grading is binary:
Complete solutions ⇒ full marks.
Incomplete or missing ⇒ zero.
Correctness is *not* evaluated.

Critical design feature:
Exam problems drawn directly from homework.
Students vote on which problems appear.

All three components due simultaneously.

The Reflection Quiz: The Lynchpin Component

Five prompts after every video set:

1. Which problem did you find **most difficult**?
2. What **mistake** did the video help you catch in your own work?
3. What method do you still need to **practice more**?
4. Which problem do you think will **most likely appear on the exam**?
5. **Create a similar problem** by changing some numbers or details.

How responses are used:

- Individual outreach to struggling students *before* they fail
- Real-time class adjustments based on aggregate difficulty patterns
- Exam planning: include problems students vote as "likely"; avoid those rated "most challenging"
- Early identification of students giving consistently shallow responses

Learning from Failure: The Implementation Journey

Fall 2024 — "Free Video" Experiment

Made all solution videos freely available with no grade attached.
Student reaction: "I'm not watching a 50-minute video that doesn't affect my grade."
Lesson: If it doesn't count, most students won't engage.

Spring 2025 — "Video-Only" Approach

Credit for watching videos; homework submission eliminated.
Student reaction: "I just let the video play in the background... I still get the points."
Lesson: Credit without accountability produces gaming, not learning.

Fall 2025 — Integrated System (current)

Both homework *and* video credit, held accountable by reflection quiz.
Students need all three to succeed — no single component can be gamed in isolation.

Preliminary Evidence from Individual Components

Course evaluations from Fall 2024 and Spring 2025 consistently highlighted two themes:

Student-Athletes

Flexible video access transformed the learning experience for students with travel schedules.

"I can finally keep up with class even when we're traveling for games."

Students with Competing Obligations

Students managing jobs, illness, and family obligations gained **equal access** to instruction.

Consistent, high-quality explanations available 24/7.

Grading efficiency (instructor benefit)

Grading time reduced by approximately **75%**, and 3–4 exam review class periods reclaimed per semester.

Why This Framework Addresses the AI Problem

	Traditional HW	This Framework
AI can complete assignment?	✓ easily	✓ homework only
AI completion ⇒ exam success?	✓	×
Student knows what is on exam?	×	✓
Instructor sees struggle early?	×	✓
Grading scales with class size?	×	✓
Works in online/hybrid?	partial	✓

The key mechanism: Transparent alignment between practice and assessment means genuine engagement with the material becomes the path of least resistance.

Honest Limitations

- **Upfront video creation cost** — substantial time investment, though one-time per course
- **Video length fatigue** — mitigated by segmenting problems and allowing pause/replay
- **Departmental final alignment** — courses with common exams require coordination; past exam problems should be incorporated into homework sets
- **Technology access** — students with limited devices need backup options (campus labs, offline formats)
- **Lower-division non-STEM courses** — full three-component system may be too heavy; a simplified homework + video version may be more appropriate

Scope of current evidence

Individual components have been tested separately. The **full integrated system** launched Fall 2025. Systematic survey data and performance comparisons are the immediate next step.

Next Steps and Future Work

Data collection (ongoing, Fall 2025–):

- Mid-semester and end-of-semester student surveys (structured Likert + open-ended)
- Exam performance comparisons with pre-implementation cohorts
- Qualitative analysis of reflection quiz responses

Planned extensions:

- Adapt framework for online-only sections (MATH 110, 340)
- Investigate applicability in upper-division proof-based courses
- Explore lightweight versions for gen-ed / non-STEM populations

Broader goal

Contribute evidence-based insights to the scholarship of teaching and learning in mathematics, offering a replicable model for colleagues facing the same AI-integrity pressures.

Summary

The system:

- Homework submission (15%) — effort accountability
- Video solutions (15%) — expert explanation at scale
- Reflection quiz (10%) — metacognitive engagement
- Exams drawn directly from homework

The philosophy:
AI tools are here to stay.
Design conditions where authentic learning is the easiest path to success.

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Happy to discuss further!