Industry-Contextualized Lesson Development
Implementation Guide

A Practical, Step-by-Step Guide for Faculty

Based on the Industry-Contextualized Gateway Math in CTE Perkins Leadership Project 2025–2026

for the North Carolina Community College System

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Introduction

This implementation guide translates the experience of the *Industry-Contextualized Gateway Math in CTE* project—a 2025–2026 Perkins CTE Leadership initiative across six North Carolina community colleges—into a practical, reusable playbook that any faculty member can follow. The project brought together pairs of North Carolina community college mathematics and career and technical education (CTE) faculty, each pair working with a local employer partner, to develop and teach math lessons grounded in authentic workplace scenarios. The overarching goal was to close the student perception gap between how mathematics is taught in the classroom and how it is actually used on the job.

This contextual lesson development approach was successfully used in the NSF-funded (DUE 1954291) *Connecting Industry to Math Instruction* (CIMI) project conducted by James Martin at Wake Technical Community College.

Contextual teaching is the practice of presenting new concepts directly within the framework of their real-world, physical application. Instead of teaching a technical skill or academic concept in isolation, contextual teaching grounds the information in a scenario environment that mirrors the actual workplace.

Note: Teaching a core subject in a real-world context is not restricted to math faculty.

How to Use This Guide

This guide is written with three audiences in mind:

- **Mathematics faculty** teaching Gateway courses (MAT 110, 112, 121, 143, 152, 171) who want to replace or supplement textbook word problems with authentic workplace challenges.
- **CTE faculty** who want to reinforce math (or other required gen. ed. skills) within their program coursework using scenarios students recognize from clinical, shop, or lab settings.
- **English faculty** who see the same opportunity to ground their instruction in real workplace demands.

The guide is organized as a step-by-step sequence for replicating the Industry-Contextualized Gateway Math in CTE project lesson development processes—from finding faculty and industry partners to developing and teaching a contextual lesson and reflecting on it. The steps can be implemented by faculty pairs or scaled up to include a cohort of multiple pairs.

The Lesson Model

Instead of teaching a technical skill or academic concept in isolation, contextual lessons situate the content in a scenario that mirrors the actual workplace. Recognize that faculty collaborating on lesson development may need professional development beforehand.

Because these lessons are scenario-based—featuring a central complex problem—any lesson framework can be used for their development. For purposes of this guide, we'll use the three-part instructional framework called Launch, Explore, Discuss—a lesson arc promoted by organizations like the American Mathematical Association of Two Year Colleges (AMATYC) and the National Council of Teachers of Mathematics (NCTM). This framework provided the structure for lessons developed by faculty in the project.

In the Industry-Contextualized Gateway Math project, every lesson includes the same sequence of activities:

- **Launch.** The instructor sets the real-world context—ideally through a short video, guest speaker, or written profile—without teaching the math directly. Students learn about an industry partner's company, hear an employee success story, and encounter the problem they need to solve for the company.
- **Explore.** Students work individually and then in groups on tasks that require estimation, critical thinking, and the selection of appropriate mathematical tools. The instructor circulates, asking questions that push thinking rather than giving answers.
- **Discuss.** Groups present and compare their solution methods. The instructor sequences the presentations to build toward the lesson's learning goals, introduces vocabulary, and summarizes the key ideas.

Note that you may need to introduce or review prerequisite skills and knowledge before the launch activity. In the math project, faculty developed this component using a free interactive platform called Desmos. An instructor in another subject might use a platform like Curipod or a favorite LMS tool to create interactive components. The math lessons cited in this guide contain four components: an interactive prerequisite math skills activity; a launch video; a student sheet with authentic tasks and critical-thinking questions; and teacher notes written after field testing. Any discipline can adopt this arc—what changes is the content inside each stage, not the structure.

Step-by-Step Implementation Sequence

The steps below are ordered chronologically. You do not have to complete every step in a single semester; a first pass can be as simple as Steps 1 through 6. Read through the steps and notice that each step includes a degree of effort tag: Easy, Moderate, or Challenging. If

you are teaching a required course other than math, substitute your discipline wherever you see math mentioned. The sequence is replicable both in Gateway English (ENG 110 and 111) courses and in subsequent courses that are particularly relevant to this activity: ENG 112 (Writing/Research in the Disciplines) and ENG 114 (Professional Research and Reporting).

If following the process to develop a contextual lesson still appears too challenging this semester, you can implement one of the existing contextual lessons developed by teams of NC community college math and CTE faculty.

Preparation: Explore Model Lessons

[EASY]

Explore existing contextual lessons that follow the Launch, Explore, Discuss instructional arc. Consider assigning one to accustom students to the lesson structure.
Industry-Contextualized Gateway Math **(NCCCS faculty can register for this content)**
Connecting Industry to Math Instruction (CIMI)

Step 1. Identify a Faculty Partner

[MODERATE]

For this sequence of lesson development to work, a math instructor needs to be paired with a CTE instructor at the same college. The strongest partnerships in the Industry-Contextualized Gateway Math project were pairs of math and CTE faculty who shared a campus, had worked together before, and had volunteered rather than being assigned. If your college designates the pair, invest extra time early in understanding each other's course schedule and structure.

Look for a CTE colleague whose students take the same Gateway course you teach, or whose program requires skills (math, writing, communication) that you teach. You do not need to know anything about each other's discipline in advance; that is precisely what the collaboration teaches you.

Step 2. Identify an Employer Partner and Arrange Virtual Meetings

[MODERATE]

Ask your CTE partner for an industry contact or reach out to a local business whose work connects to course content. Your "elevator pitch" should focus on what the employer gets in return: student awareness of a career field and workforce opportunities, better-prepared future employees, and stronger soft skills in the emerging workforce.

Keep the ask small and specific. The project found that employers were willing to participate when the commitment was clear. You will need them to:

- attend three to four virtual meetings,
- arrange one site visit for the faculty pair,
- write a short document outlining the company scenario and associated employee task,
- and review one lesson scenario.

Do not ask them to teach or design curriculum. The formal invitation letter used in the project is reproduced at the end of this guide as a template you can adapt.

Set up three or four virtual meeting dates and times and arrange an onsite visit to the partner's company.

If you cannot find an employer, you can still create an authentic lesson. Use published case studies, news stories about local companies, or AI-generated scenario starters (see Step 4) combined with your CTE partner's firsthand program knowledge. The result will lack the employer's name and video, but the math concepts and the workplace context will still be real.

Step 3. Select Your Math Topics and the Employer's Task

[MODERATE]

Come to the first employer meeting with a list of the math concepts your course covers. Ask the employer what tasks their employees do that require application of those concepts.

The repeatable process from the project was:

1. Share a model contextual lesson and an industry scenario document as examples of the end product.
2. Share your course's focus topics and ask which employee tasks require application of any of those.
3. Listen, discuss, and jointly select one context to develop.
4. Ask the employer to write a short document (one to two pages) describing the scenario and its specific tasks, then email it to both faculty partners. The employer document does not need to be polished—it just needs to describe a real task with enough specificity that students believe it.
5. Schedule a follow-up meeting so both faculty can question and clarify the scenario.
6. Schedule a site visit (or virtual tour) so faculty can see the work firsthand and identify employees who could speak to students.

Step 4. Use AI to Jumpstart the Scenario

[EASY]

Scenario-based instruction helps students see how a skill set will be important to their future by providing instant lesson context. They are more likely to engage in the content when concepts are presented in a meaningful, concrete way.

Use generative AI to draft scenario starters to refine with your employer partner. AI will not replace the employer's authentic input, but it dramatically reduces the blank-page problem.

Write the prompt using precise parameters. The project used a prompt formula:

"Write [number] real-world scenarios for [level-of-work] [job position] in [sector] using [skill to be demonstrated] to solve a problem in the [workplace context]."

For example:

- "Write three real-world scenarios for entry-level technicians in biotechnology using unit conversion to solve a problem in the biopharmaceutical workplace."
- "Write two realistic workplace scenarios for a caseworker at a county social services agency using percentage-based calculations to determine client eligibility for benefits."

For an English course, use the same prompt formula but replace the math skill with a communication skill.

- "Write a real-world scenario for a Materials Testing Technician who must write a clear, accurate field report about a concrete test failure so that the project manager can decide on next steps."
- "Write a real-world scenario for an entry-level Quality Control Technician who must present a 5-minute summary of batch quality data to a cross-functional team, including scientists and managers who are not statisticians."

Evaluate each AI response against three criteria.

1. Is the problem authentic?
2. Is it a good starting point for a conversation with the employer?
3. Can you envision developing it into a lesson with thought-provoking activities and critical-thinking questions?

Refine the prompt and regenerate as needed. Evaluate the AI-generated scenario for authenticity and refine it with your employer partner if you have one.

Step 5. Create the Student Activity Sheet

[MODERATE]

Translate the employer scenario into a student document organized around the Explore stage. Include these elements, in order:

1. **Introductory thought questions** requiring estimation and intuition about the context before any calculation.
2. **Core tasks authentic to the industry,** where students select mathematical tools and apply them.
3. **Critical-thinking questions** that connect several skills and require persistence.
4. **Discussion questions** that ask students to explain their reasoning and compare methods.

Write a solutions document at the same time. If using Amplify for prerequisite-skill review, build that activity now as well.

Timeline note from the Gateway Math project: Faculty had about four weeks from the date of the employer meeting to a completed first draft of the Student Activity Sheet. Give yourself at least that long.

Step 6. Create the Launch Material

[SEE TABLE FOR EFFORT REQUIRED]

The Launch component introduces the company, shares a role-model success story, and presents the problem. The professionally produced launch video was the most resource-intensive element created by the project, but it is replaceable. The industry scenario and authentic problem provided by the employer are the important part. A college with little or no media budget can preserve the instructional value by substituting a no-cost alternative. Each can be produced with a phone or laptop and a willing employer.

Launch Format	Cost	Effort	Notes
Existing CIMI or Gateway Math video	Free	**Easiest**	Dozens of Launch videos already exist in the Contextual Math playlist. Use them for your first lesson while you develop your own local context.
Short recorded phone or laptop interview	Free	**Easy**	This can be a 3–5 minute interview on a phone or laptop with no editing required. This accomplishes the same framing as a polished video. Free conferencing tools can record automatically. Ask your employer partner to describe: 1. What the company does, 2. A typical employee's path to being hired and their daily routine, and 3. The problem for students to solve by applying content knowledge and critical thinking in the context of the employer's company.
In-person or virtual guest speaker	Free	**Easy**	Invite the employer to address the class for 10–15 minutes in person or over video chat. A speaker delivers the company overview, the success story, and the problem context in a single low-cost visit. One faculty member in the project recommended this over video production.

Launch Format	Cost	Effort	Notes
Written employee profile + site photos	Free	**Moderate**	A one-page employee success story and a few workplace photos will give students the visual context for the problem they are asked to solve. The employer can supply both by email. This launch idea requires a little more effort on the part of the employer.
Shared virtual employer panel	Free	**Moderate**	The project's Career Conversations provide a low-cost model in which a panel of employers reached students at many colleges via webinar. Two benefits to the approach are: 1. Students enjoy hearing perspectives from different sectors 2. Multiple instructors could invite their industry partners to participate in a virtual panel, eliminating the need for separate launch videos. Students placed high value on hearing from employers directly, but this launch idea requires a lot of coordination.
Professional video	High	**Challenging**	This is well worth the effort if your budget allows. It requires a videographer, employer cooperation over multiple site visits, and a lot of coordination.

Bottom line: The authenticity of the lesson launch comes from the employer's story and the problem they present for students to solve.

Step 7. Create Assessment Guidelines

[EASY]

Think about how to grade the lesson, if at all. Math and CTE faculty will see the content and its alignment with their course objectives differently and thus will most likely use different assessment approaches.

Consider the purpose of the assignment. Are students learning something new or demonstrating mastery? Do you have expectations for group problem-solving that can be described in a rubric and assessed?

Reflect on your sequence of course topics for the semester. Does this lesson fit somewhere naturally in your instruction cycle or is it "extra"? Does it serve as a capstone assignment because it requires students to demonstrate application of multiple skills?

Think about student participation. One instructor found that when the lesson was assigned in the LMS, students took a zero rather than complete it. When done in class in groups of two to three, engagement rose sharply. Face-to-face group work also built the communication and teamwork soft skills employers value. Another instructor, however, assigned the lesson to groups in her online course and found that they went above and beyond in meeting the assignment requirements.

Weight it meaningfully. Consider how you will assess and weight the assignment. An instructor who moved the lesson from a homework grade to a test grade saw completion increase.

Step 8. Pilot the Lesson in Class

[MODERATE]

Assign the lesson to one section. Plan for it to take two or more days, particularly if students have not experienced the Launch, Explore, Discuss structure before. Some will enjoy working on real workplace problems and others may struggle in the beginning because they are uncomfortable with critical thinking and decision making without prescriptive guidance from the instructor. The strategy pays off, however, as noted by a project faculty member who was nervous about leaving so much open-ended but found that students responded creatively and that their presentations were "phenomenal," showing careful, critical thinking.

Always begin with a launch video (or other relevant activity) first. The context gives the content a purpose before students encounter it in the lesson.

Explore! If you have created an interactive component for teaching or re-teaching prerequisite content, have individual students complete that next. Then move into group assignments using the Student Sheet. Faculty found the lessons most effective when students worked in small face-to-face groups, which also built the communication and teamwork soft skills employers value.

Incorporate time for discussion. Structured discussion is a key part of the lesson. It keeps students engaged and thinking critically as they present possible methods and solutions while also allowing instructors to gauge their understanding.

Step 9. Write the Teacher Notes

[EASY]

After piloting, write practical notes for any future instructor who teaches this lesson. Include where students struggled, how you handled groups and presentations, what grading weight worked, and any prerequisite gaps that surfaced.

Share!

[EASY]

Encourage colleagues to teach it, give feedback, and create their own contextual activities. The project faculty presented at the NCMATYCconference and found that peers were enthusiastic about adopting the lessons.

Timeline for Developing and Piloting Contextual Lessons

	Task	Schedule
☐	Identify faculty partner (math + CTE, or other Gateway course. + CTE)	Week 1
☐	Meet to compare course topics and identify overlap	Week 2
☐	Identify and contact employer partner (or decide to proceed without one)	Weeks 2–3
☐	Use AI to generate 2–3 scenario starters aligned to course topics	Week 3
☐	Hold first employer meeting: share model, listen for tasks, select one	Weeks 3–4
☐	Employer writes one-page scenario document	Week 5
☐	Faculty follow-up meeting to clarify and question the scenario	Week 6
☐	Site visit or virtual tour (if possible)	Week 6–7
☐	Draft Student Activity Sheet with thought, core, critical-thinking, and discussion questions	Weeks 7–8
☐	Write solutions document	Week 8
☐	Develop prerequisite-skills activity (Desmos, Amplify, or simple review)	Week 8–9
☐	Create Launch material (video, recording, speaker, or written profile)	Weeks 8–10
☐	Pilot the lesson in class (small groups recommended)	Teaching week
☐	Write Teacher Notes after piloting	Week after lesson
☐	Share completed lesson with colleagues	End of semester

Shortcuts to Implementing Contextual Lessons

Option A: Start with what already exists. You can try the approach immediately by assigning existing lessons before developing your own. You'll find free, ready-to-use industry-contextualized lessons from the CIMI project here and the Industry-Contextualized Gateway Math project at OpenNCCC.

Option B: Follow the simplest path to creating and using contextual lessons.

1. Pick one topic from your course.
2. Ask a CTE colleague or employer, "What do your employees actually do with this?"
3. Use AI to draft a scenario.
4. Write a one-page Student Activity Sheet with three to five questions.

5. Introduce the scenario to your class with a two-minute verbal description and assign the questions as group work. You now have a contextualized lesson. Everything else in this guide makes it richer, but you can start here.

Keep the Essentials. Not everything will go perfectly. Your employer partner may stop responding; your CTE partner may be pulled to other duties; your college may not fund a video. The table below identifies what you can drop and still produce a contextualized lesson and what you cannot drop.

Essential (Cannot Drop)	Valuable but Replaceable	Nice to Have
A real or plausible workplace scenario grounded in an actual job task. A student activity with authentic tasks, thought questions, and critical-thinking questions. At least one faculty member who understands both the course objectives and the workplace context.	The Launch–Explore–Discuss lesson structure. Contextual teaching is not limited to one instructional design framework. A named employer partner. The industry information provided by an employer could be replaced with a combination of CTE faculty knowledge + AI + published sources. A professionally produced video. You can substitute a guest speaker, phone recording, written profile, or other launch idea. A formal faculty pair (one instructor can do this alone if necessary, though the partnership enriches it).	Interactive prerequisite activities. These are useful but not required—any review method works.

Extending the Model to English, Writing, and Communications

The Launch, Explore, Discuss framework is discipline-neutral. It works whenever you can ground instruction in a real workplace situation that students find interesting. The same employer partnerships that produce math scenarios can produce scenarios for English composition, business and technical writing, oral communications, and interpersonal skills.

Why Employers Care

In the RTI regional talent surveys of over 1,300 employers across the Triangle and Cape Fear regions (2023–2025), the top three "soft skills most difficult to find in the labor pool" were the same across industries, regions, and survey waves: communication skills, problem-solving/critical thinking, and work ethic/reliability. Communication was consistently number one. The same theme dominated this project's Career Conversations panels, where every employer panelist named communication as essential and several described it as their biggest hiring challenge. When you approach an employer about helping contextualize an English or communications course, you are offering to help solve a significant workforce skills gap.

How the Model Translates to English Courses

The table below maps each component of the math lesson model to a parallel component for Gateway English courses.

Component	Math Version	English / Writing / Communication
Employer input	"What tasks do your employees do that require math?"	"What writing, reading, or communication tasks do your employees struggle with or do every day?"
Scenario document	A one-page description of a real math-intensive job task (e.g., calculating concrete strength, analyzing batch data).	A one-page description of a real communication task (e.g., writing a client-facing incident report, presenting a project status update, translating technical results for a nontechnical audience).
Launch	Video or guest speaker introducing the company, a role model, and the math problem.	Video or guest speaker introducing the company, a role model, and the communication challenge.
Student Activity Sheet: Thought questions	"Estimate how many cubic feet of air this room holds."	"Who is the audience for this report? What do they already know? What will they do with the information?"
Student Activity Sheet: Core tasks	Calculate, model, analyze data.	Draft, revise, present, or critique a document in the workplace genre (memo, email, report, presentation, social media post).

Component	Math Version	English / Writing / Communication
Student Activity Sheet: Critical thinking	"Which of your two methods gives a more reliable result, and why?"	"The client responded negatively to the first draft. Revise for tone and specificity, then explain what you changed and why."
Discussion	Groups present and compare mathematical solution methods.	Groups present and compare drafts; peer-review feedback is given from the employer's point of view.
Prerequisite skills	Desmos review of needed math concepts.	A short review of genre conventions, audience analysis, or grammar mechanics relevant to the task.

Lesson Adaptability Across Disciplines

The faculty-developed contextualized math lesson, **"Concrete Strength: From Field Testing to Load Calculations"** provides the perfect illustration of cross-disciplinary use of the same industry scenario. In that lesson, students complete a series of activities requiring calculations and data analysis connected to standard deviations of real-world concrete compression and use that information to make informed decisions to mitigate any potential concrete structural issues. The final activity in the lesson is to use the data to:

> *write a one-page recommendation memo to the client summarizing your findings, conclusions, and recommendations…Based on your analysis, clearly state whether you recommend that construction proceed as planned or whether mitigation measures should be implemented before continuing construction. If you identify concerns with the concrete strength results, support your recommendations using the test data, calculations, and analysis from the report. Be sure to explain and justify any mitigation strategies, additional testing, design modifications, or construction changes you would recommend to address the issue.*

The key insight is that a math lesson about concrete strength and an English lesson about writing a persuasive, well-documented client memo can be assigned in the same semester to the same students—reinforcing both skill sets and making the connection to employment unmistakable.

Faculty Tips on Contextual Lesson Development

At the end of the project, participating math and CTE faculty shared their reflections and recommendations for instructors or colleges wishing to replicate the lesson development activities.

- **In-class group work beats online-only.** Students were far more engaged working in small groups during class than completing the lesson as an online homework assignment. If your course is fully online, structure it as a group project with a discussion board or video presentation for students to share their findings. This strategy for using the lessons online worked well.
- **Open-endedness is a feature, not a bug.** Faculty nervous about leaving questions open-ended found that students responded with more creative, critically thoughtful work than they produced on structured, single-answer assignments.
- **Respect fixed curricula.** Some colleges standardize course content. If you are at such a college, position the contextualized lesson as an activity within an existing unit rather than an addition. The project's most effective CTE pilot—a biotechnology course—assigned the lesson in the final week of a biomanufacturing unit, where it served as a capstone activity.
- **Use the industry site visit wisely.** Faculty who visited the employer site came back with clearer scenarios, stronger relationships, and better stories for students. Even a brief virtual tour helps.
- **Students respond to role models.** The most powerful moments in the Launch videos and Career Conversations were when students saw community-college graduates in professional roles. It made the career path feel attainable. When creating your Launch, feature an employee whose educational background matches your students'.

Start Where You Are

Students engage with mathematics—or writing, or any core skill—when they can see that it is useful in the world outside their classes as a tool for performing tasks and solving problems. In this guide, the Launch, Explore, Discuss arc gives a lesson its shape, an employer's authentic problem gives it credibility, and a faculty partnership gives it depth. That said, start where you are. You don't need a big budget or a flawless first draft to begin. If you have an industry scenario, a student activity built around authentic workplace problems, and critical-thinking questions, you have a contextualized lesson. A simple two-minute problem description and a one-page student worksheet are enough for a trial run. Use the templates provided in the Appendix to organize your thoughts. By teaching contextually, you will help students understand the relevance of their coursework through authentic, concrete applications.

APPENDIX

TEACHER NOTES TEMPLATE

TEACHER NOTES

(Lesson Name)

Amplify/Desmos Prerequisite Skills Review Activity (link)

Purpose:

Career Field and Company:

Course Alignment and Math Topic:

Prerequisite Skills:

Resources Needed:

Vocabulary:

The Teaching Cycle:
Launch
Explore
Discuss

Exit Question with Solution:

Lesson Author(s) and Contact(s): optional

STUDENT ACTIVITY SHEET TEMPLATE

STUDENT ACTIVITY SHEET

(Lesson Name)

Career Field and Company:

Prerequisite Activity: (Desmos or other interactive review)

Introduction: (scenario and launch video)

Activity Overview

Vocabulary

Industry Tasks: (Include initial thought questions and conclude with reflection and discussion questions)

You're invited to be our industry partner!

Integrating Industry Tasks and Skills into Gateway Math and Technical Courses

Gateway Math in CTE, a project of the North Carolina Community College System, is designed to bridge the disconnect between how math is taught in the classroom and used on the job through problems, examples, and scenarios from NC employers.

The project will increase the ability of career and technical education and math instructors to help students understand the relevance of math beyond the classroom and improve their concept mastery through concrete applications. We are inviting you to collaborate with us in the development of interactive math lessons built around authentic problems or tasks from your company.

Each lesson includes an introductory video featuring an interview with a worker at the company site who explains the problem that needs a solution. The featured workers represent success stories and role models in career fields students may not have considered. You can view model lessons here.

Industry Partnerships are the key to making this project successful.

Specifically, you would commit to:

- Meet virtually with us 3-4 times this fall to share math related tasks that are done by your employees and the soft skills you are looking for when hiring.
- Help us develop one authentic industry math lesson related to a job task of your employees.
- Be available for an interview by our professional videographer to create the "Launch Video" that will highlight your company, share a success story of an employee, and introduce students to the real-world context of the math tasks.
- Host one half-day visit to your company for 2 college faculty members so they can interact with some of your employees and see first-hand the tasks that your employees are doing.
- Consider serving on a panel of industry partners that will interact virtually with students across North Carolina to share career advice. (Spring 2026)

You will play a vital role and we thank you for being willing to share your expertise! Please let us know whether you are able to collaborate with us.

Faculty member name	Faculty member name
Position	Position
College	College
Contact	Contact