In 2007, the New Jersey Education Association (NJEA) founded NJCTL as an independent nonprofit organization.

Our MISSION is to empower teachers to lead school improvement, so all children have access to a high-quality education.

Our FOCUS is, and has been, on redefining the teaching and learning of science and mathematics.
We are here to help you Every Step of the Way

NJCTL is a nonprofit run by teachers, for teachers.

We support teachers with everything they need to provide quality math and science education to their students.

Our goals are to reduce stress, help improve student outcomes, and together create a scalable solution for the STEM crisis.
Our organization stems from the development of a unique science and mathematics program at the Bergen County Vocational-Technical High School in Teterboro, NJ.

That program resulted in the school becoming a leader in science and mathematics, with every student taking physics and the vast majority taking AP science.

It is now ranked among the top 100 U.S. high schools both overall and in science and mathematics.
The program began in one classroom at one school, with one teacher.

He had left a successful business career to teach high school physics.

Bob saw the disconnect between Algebra and Physics among 9th graders.

So, he began teaching a mathematically rigorous Algebra-Based Physics course.
Algebra-Based Physics was key since physics:

• Is required for most all STEM career paths, including engineering.
• Is the foundation for science; it makes science make sense.
• Provides students the motivation and context to learn and practice mathematics.
The Old Sequence

- Subjects in Isolation
- Lack of Flow or Coherence

9th Grade
- Biology

10th Grade
- Chemistry

11th Grade
- Physics

9th Grade
- Algebra I

10th Grade
- Geometry

11th Grade
- Algebra II
The New Sequence

- Vertical & Horizontal Alignment
- Strong Flow & Coherence
Curriculum Coherence

Vertical alignment: each year builds the foundation for the next year.

Horizontal alignment: what is learned in math is used in science and vice versa.

This reshaped how high school math and science courses were taught at Bergen Tech.
A New Sequence of STEM Subjects – with APs
How NJCTL Began

The reordering to align Algebra & Physics produced significant results:

- Rigor and stress were decoupled.
- Teacher satisfaction and effectiveness improved.
- Mathematics and science became demystified.
- Students loved science & mathematics.

By 2003, all students were taking 9th grade physics.

By 2005, Bergen Tech was #1 in the state for taking AND passing AP Physics B.
How NJCTL Began

The work of NJCTL has expanded across the globe, but our commitment to STEM education remains and Bergen Tech continues to thrive.

In 2019, 93% of students took at least one AP Exam with 89% of students passing at least one AP Exam.
Increasing Enrollment & Improving Achievement in AP Science

Along with this new course sequence, increasing AP participation and achievement requires a multi-pronged approach:

- Early success in mathematically rigorous science subjects.
- A pedagogy that is engaging and maximizes student success.
- A curriculum that is intentionally aligned to the AP expectations.
- Well prepared AP teachers.
- A culture of “4th Credit” in your school.
Free, Editable Classroom Materials

Since 2009, everything needed to implement these courses has been made available for the free use of all at www.njctl.org.

This is part of a collaborative professional model that helps teachers focus on teaching and learning, rather than repetitive, redundant prep.

We began in physics but expanded to include almost all K to AP Mathematics & Science and AP Computer Science.
Free, Editable Classroom Materials

80 free, editable digital classroom courses include:

• 285,000 slides
• 15,000 videos
• 13,000 Word docs

And last year had:

• 3.5 million pageviews
• By 230,000 unique users
• In all 50 states and 180 countries
Let’s Dig Into the Resources

Free Classroom Teaching Materials

Mathematics
Mathematics (Español)
Math Intervention

Science
Science (Español)

Courses by State/Country

English Language Arts

Courses
K-5 Engineering Activities
Kindergarten Science
1st Grade Science
2nd Grade Science
3rd Grade Science
4th Grade Science
5th Grade Science
Physical Environment
Living Environment
Mathematical Physics

Algebra Based Physics
Chemistry
Biology
NYS Regents Physics
AP Physics 1
AP Physics 2
AP Physics C - Mechanics
AP Physics C - Electricity & Magnetism
AP Chemistry
AP Biology
NJCTL’s Classroom Pedagogy

Editable digital presentations replace the need for costly textbooks enabling an effective pedagogy that connects brief direct instruction to social constructivism through formative assessment.

Direct instruction is a fast, efficient way to convey information.

However, that information needs to be internalized by each student in their own way; they each need to build a mental model.

Formative assessment questions help drive that internalization which is supported and cemented by social constructivist interaction with their peers.
A net force $F$ accelerates a mass $m$ with an acceleration $a$. If the same net force is applied to mass $2m$, then the acceleration will be

- A $4a$
- B $a/2$
- C $2a$
- D $a/4$
- E I need help

Polling Results:
- 32% for Answer B
- 27% for Answer A
- 5% for Answer D
- 9% for Answer E
- 18% for Answer C
Student polling devices connect direct instruction and social constructivism through real-time formative assessment.
Unit Plans

Unit plans contain everything needed for lesson planning:

• standards

• essential questions

• formative & summative assessments

• labs

• day-by-day instructional sequence and pacing
Labs

Both virtual and physical labs help students develop a deeper understanding of the content learned in the unit presentation.
Student Materials

• Classwork, homework and assessments align directly to instruction.

• Physical and virtual labs are provided with instructions for students and instructors.
An AP-Aligned Curriculum

• Unit exams mirror the format of the AP exam with both multiple choice and free response questions.

• Problem-solving presentations aligned to AP-style questions.

• Formative assessment questions are AP-aligned.

• Labs meet the AP requirements.
End-of-Year Prep for the AP Exam

March/April course final exam that directly mirrors the AP Exam.

Students work collaboratively to review weak areas, prepare and retest.

"Flipped" classroom materials available in:
• AP Physics 1 & 2
• AP Physics C: Mechanics and E&M
• AP Chemistry
Courses for Teachers

Online and Asynchronous. Prepare to Teach AP.

**Content courses** include:

- online quizzes,
- virtual labs that enable laboratory investigations via simulations,
- virtually proctored tests.

All available anywhere, anytime.
AP Physics Courses for Teachers

**PHYS6603**
$750 (5 CREDITS) - LEARNING AND TEACHING AP PHYSICS I

**PHYS6605**
$750 (6 CREDITS) - LEARNING AND TEACHING AP PHYSICS II

**PHYS6631**
$750 (4 CREDITS) - LEARNING AND TEACHING AP PHYSICS C: MECHANICS

**PHYS6633**
$750 (4 CREDITS) - LEARNING AND TEACHING AP PHYSICS C: ELECTRICITY AND MAGNETISM
AP Chemistry Courses for Teachers

**CHEM6703**
$750 (5 CREDITS) - LEARNING AND TEACHING AP CHEMISTRY - PART I

**CHEM6705**
$750 (6 CREDITS) - LEARNING AND TEACHING AP CHEMISTRY - PART II
AP Computer Science Courses for Teachers

CSCI 6313
$750 (5 CREDITS) - LEARNING AND TEACHING AP COMPUTER SCIENCE A - PART I

CSCI 6315
$750 (5 CREDITS) - LEARNING AND TEACHING AP COMPUTER SCIENCE A - PART II

Coming Soon: Learning and Teaching AP Computer Science Principles
Accessing Free Classroom Teaching Materials

All resources are available for the free use of all at www.njctl.org

- Register as a teacher to see assessments.
- Use your school email address to be easily identified as a teacher.
- (MSTA) after your school’s name.

Join our email list: www.njctl.org/email
Helping you teach math and science every step of the way