Crafting Engaging Science Environments

CESE

A Transformative Science Learning System

This project is funded by the Education Innovation and Research grant program from the U.S. Department of Education.

Barbara Schneider, Joseph Krajcik, Sheneka Williams, & Clausell Mathis

Samantha Strachan

Lei Zhang

Elizabeth Tipton

Tony Latiker

TABLE OF CONTENTS

CESE Project Overview

PROJECT OVERVIEW

Crafting Engaging Science Environments (CESE) is an innovative science enrichment program for chemistry and physics classrooms providing learning and instruction to students in U.S. southern schools. This project works in partnership with Alabama A&M University, Winston-Salem State University, Jackson State University, Michigan State University, and Northwestern University.

CESE brings together project-based learning and science knowledge that improves students' science academic performance which keeps them on track to successfully complete their science courses. CESE will also strengthen their academic portfolio for admission to two- or four-year higher education institutions or postsecondary technical schools.

PROJECT-BASED LEARNING

In project-based learning, students:

- Pursue solutions to meaningful questions.
- Explore why scientific phenomena occur, learn important disciplinary ideas, and engage in science practices.
- Participate in collaborative activities.
- Create artifacts that demonstrate learning.

COMMUNITY-BASED APPROACHES

- Integrate students' community resources and experiences into the learning and teaching of science.
- Seek to make science meaningful to students by connecting it to their lived experiences and communities.

Enhancing Science Learning and Instruction With **CESE**

CESE Aligns with Mississippi's Goals

Mississippi's Science Course of Study and Strategic Plans

- **Student Experience:** Centers on high school chemistry and physics courses, preparing students with knowledge necessary for college admission, careers, or the workforce.
- **Teacher Development:** Offers high-quality, research-based, state standards-aligned professional development.
- **Student Learning:** Strengthens science foundations, boosts assessment performance, and inspires deeper engagement with real-world issues.
- **Teacher Learning:** Equips teachers with the content knowledge, instructional strategies, and resources needed to support students in meeting their learning goals.

Benefits of CESE

- **Reduce Teacher Preparation Time and Support Lesson Planning:** Supplies ready-to-use enrichment materials, including teacher guides with resources, lessons, assessments, and student handouts.
- **Flexible Enrichment Materials:** Enables teachers and school leaders to adapt the materials to meet their needs and continue to use them year after year.
- **Year-Long Support for Teachers and Schools:** Provides honorariums to schools and teachers, professional development, continuing education credits, and collaboration opportunities for teachers.
- **Community Building:** Meets the needs and experiences of students and teachers in the South, fostering continuous collaboration and strenghening the community.
- **Technology:** Embeds technology in instruction, modeling, and assessments to enhance student learning.
- **Evaluated Independently:** Measures science learning with rigorous independent assessments.

CESE School, Student, and Teacher Benefits

PROGRAM DETAILS

With the right resources and support, high-quality chemistry or physics classrooms can ensure students thrive in society and the workplace. To support this vision, CESE provides a comprehensive program that includes innovative, hands-on experiences for teachers and students, professional development for teachers, and a wealth of tangible classroom resources that enhance science learning and instruction.

CESE PROVIDES THESE BENEFITS TO YOUR SCHOOL

Honorarium: Schools and teachers receive an honorarium for their participation.

Comprehensive Program Aligned with State Standards: Teachers access innovative, hands-on experiences that align with state standards.

Essential Materials: All project materials will be provided to the teachers, ensuring that they have everything they need (e.g., technology, digital learning materials, games, lab equipment, and supplies).

Additional Resources and Supports for Teachers: Teachers will receive continuing education credits, access to a helpline, and opportunities to expand their professional science networks.

STUDENT BENEFITS

Increase:

- Science achievement scores
- College and career ambitions
- Engagement in science

Access to:

- Hands-on science experiences
- Strategies for science learning and test taking
- Post-secondary application, enrollment, and career planning resources

SCHOOL EXPECTATIONS

Ensure Access to Chemistry and Physics Teachers: Teachers have the opportunity to attend three 2-day, in-person professional development sessions and periodic online meetings.

Aid in the Collection of Student, Teacher, and Administrator Data: Assist CESE team in accessing student, parent, teacher, and administrator consent forms and relevant data. All CESE activities, materials and assessments meet *Family Educational Rights and Privacy Act (FERPA)* requirements for students, parents, teachers, and administrators.

PROJECT TIMELINE

07/01/25 Start Date

06/30/26 End Date

PROJECT SUSTAINABILITY

Retention of Guides & Materials: Schools will keep all the curriculum materials, enabling teachers to use them year after year without additional cost or effort.

CONTACT INFORMATION

For more information or any questions, please don't hesitate to reach out to:

CESE Project Director
Eno Idiagbonya, idiagbon@msu.edu

CESE
Post-Project Benefits

SCHOOL BENEFITS

Retention of Guides & Materials: Schools keep all the science materials without additional costs or effort.

Retention of Partnership with State University: University partners can continue to provide professional development opportunities for teachers and administrators.

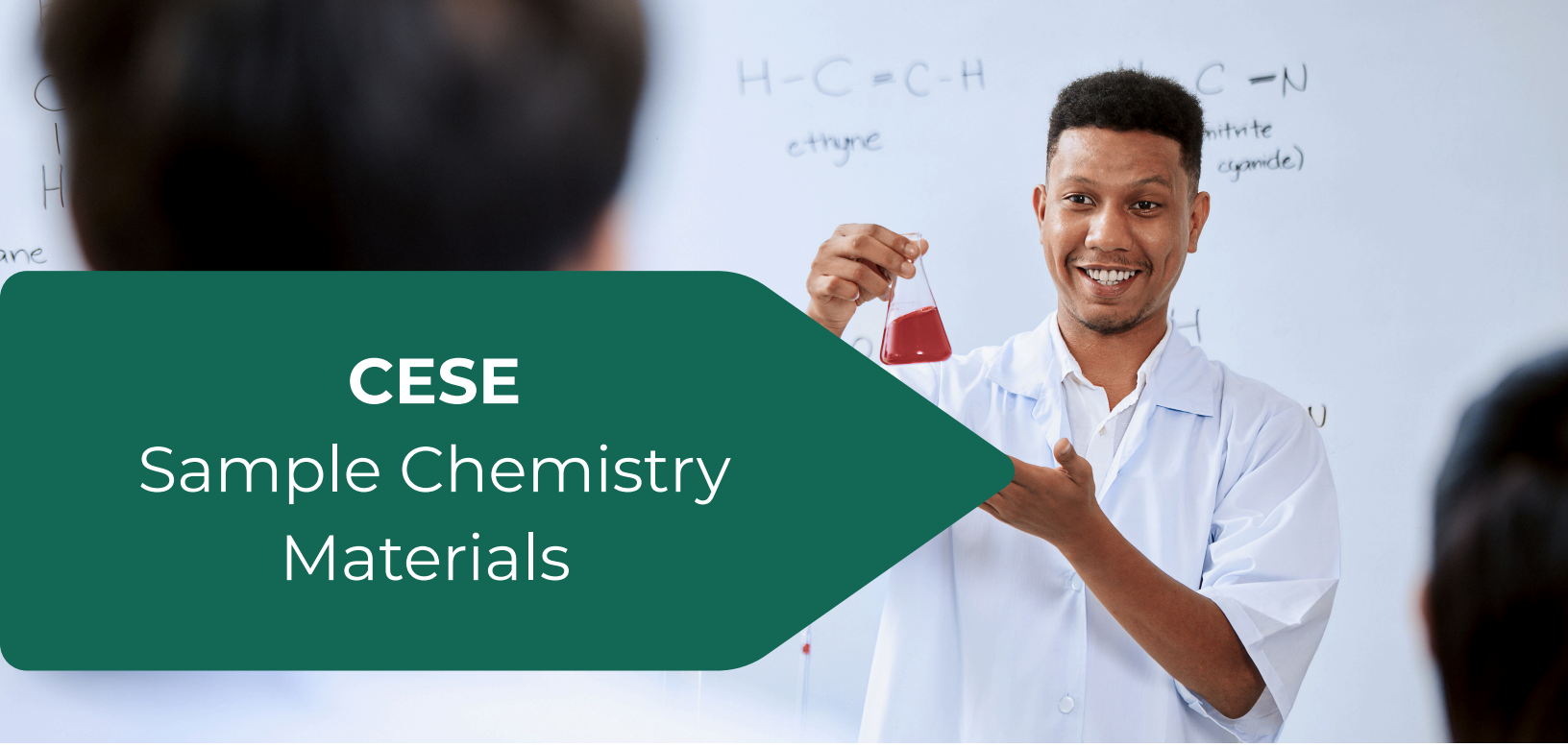
STUDENT BENEFITS

Post-Secondary Education Access Resources: Students will have access to resources for two- and four-year postsecondary institutions, including application support, college counseling services, financial aid planning resources, and connections to partnering post-secondary institutions, including career and technical programs.

Career Planning Support: Students will receive career planning resources which are aligned with their education and professional aspirations.

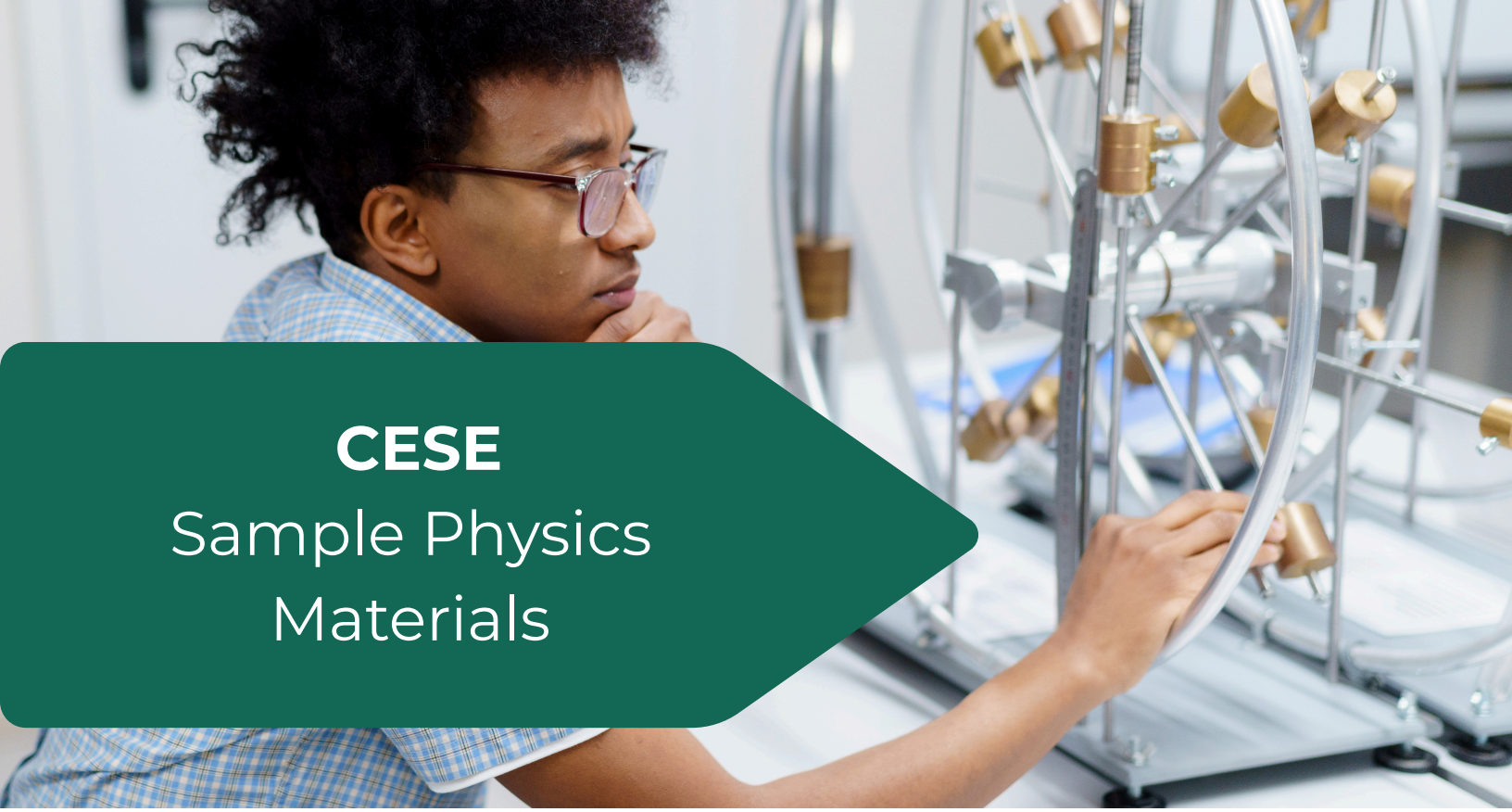
Two Exemplar Program Experiences:
One in Chemistry and One in Physics

CESE



CESE
Sample Chemistry Materials

Contents



CESE
Sample Physics Materials

Contents

Enhancing Science Learning and Instruction With **CESE**

CESE Aligns with Mississippi's Goals

Specifically Mississippi's College & Career- Readiness Standards for Science & Strategic Goals

- **Science and Engineering Practices:** CESE engages students in science and engineering practices by examining real-world phenomena.
- **Crosscutting Concepts and Disciplinary Core Ideas:** CESE integrates crosscutting concepts to emphasize core ideas across disciplines.
- **Project-Based Instructional Strategies:** CESE supports teachers to effectively design lab activities that show scientific inquiry and help students design and conduct scientific investigations.
- **Vision Alignment:** CESE can help "provide students with the knowledge and skills to be successful in college and the workplace, and to flourish as parents and citizens." (See Mississippi Readiness Standards.)
- **Mississippi Strategic Goals:** CESE can:
  - Aid in expanding students' opportunities to STEM pathways (Goals 1, 2, 4).
  - Strengthen students' aspirations for post-secondary opportunities.
  - Aid in developing a cadre of science educators with strong content knowledge and pedagogical skills (Goals 2, 4, 6).
  - Provide science-based Professional Development & supports to increase teacher effectiveness (Goals 1, 2, 3, 4, 6).

Benefits of CESE

- **Reduce Teacher Preparation Time and Support Lesson Planning:** Supplies ready-to-use enrichment materials, including teacher guides with resources, lessons, assessments, and student handouts.
- **Flexible Enrichment Materials:** Enables teachers and school leaders to adapt the materials to meet their needs and continue to use them year after year.
- **Year-Long Support for Teachers and Schools:** Provides honorariums to schools and teachers, professional development, continuing education credits, and collaboration opportunities for teachers.
- **Community Building:** Meets the needs and experiences of students and teachers in the South, fostering continuous collaboration and strenghening the community.
- **Technology:** Embeds technology in instruction, modeling, and assessments to enhance student learning.
- **Evaluated Independently:** Measures science learning with rigorous independent assessments.