RET Site: Integrating Data-driven research in Renewable Energy Across Disciplines (I-READ)

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OBJECTIVES

Overarching Goal: Create a dynamic multidisciplinary environment and a Community of Practice (CoP) where research, education and outreach are integrated to provide STEM teachers in Grades 6-12 with opportunities to conduct authentic cutting-edge research and develop a series of innovative curricular modules for promoting renewable energy and data science in South Texas.

Specific Objectives:

- Provide research opportunities on different facets of data-driven renewable energy research to qualified middle and high school (Grades 6-12) STEM teachers
- Increase the number of underrepresented students pursuing STEM majors and careers through a series of innovative curriculum development and implementation
- Build a sustainable bond through the CoP among Texas A&M University-Kingsville (TAMUK) faculty, STEM teachers, researchers, community college faculty, graduate students and industries to accelerate STEM education in South Texas

PROGRAM STRUCTURE

- **10 middle and high school (Grades 6-12) STEM teachers in 5 summer research projects**
- **6-weeks of team-based summer research and professional development activities at TAMUK**
  - Faculty and student mentors - Industrial advisor
    → *Data science* → *Renewable energy*
  - Field trips, Seminars/Webinars/Workshops
  - Develop curricular modules based on the research
  - Submit a final report and poster, and give a presentation
- **Year Long Activities**
  - Implementation of Curricular Modules in the following school year
  - School Visits and Webinars
  - Dissemination and Sharing
    → Conference presentation → Presenting to the peers
  - Awards to support additional teachers to implement the developed curricular modules in their classrooms
  - Video recordings of participants' RET experience: RET website, social media and YouTube
  - Program Evaluation

Project Website

https://www.tamuk.edu/engineering/institutes-research/NSF-RET-Program/Index.html

Summer Program Activity Schedule

Week	Day 1	Day 2	Day 3	Day 4	Day 5
W1	• Orientation • Research training	• Training on the skills needed for the research project • Develop and present research plan • Curricular module development training • Workshop offered by the TAMUK Center for Teaching Effectiveness			
W2-5	• Weekly group discussion and community building • Monday lunch seminar by industry professionals		• Wednesday research lunch seminar offered by REU students		• Friday lunch seminar for community building and establishment of CoP
	• Conduct research activities • Develop curricular modules • 2-3 Half-day field trips				
W6	• Summarize the research findings and finalize the curricular modules • Write report, prepare poster and presentation slides				**Administrators Day** (presentation & meeting)

KEY ACCOMPLISHMENTS

- **10 RET participants were recruited for the 2023 summer program** (June 12 - July 21, 2023) **from 6 different neighboring ISDs** (Kingsville, Corpus Christi, Flour Bluff, Driscoll, Ricardo, and Brooks County)
  - **40%** first-generation college graduates, **50%** female, **60%** Hispanic/Latino
  - **70%** high school STEM teachers (Grades 9-12), **30%** middle school STEM teachers (Grades 6-8)
- **10 RET participants were recruited for the 2024 summer program** (June 17 - July 26, 2024) **from 7 different neighboring ISDs** (Kingsville, Bishop, Santa Gertrudis, Corpus Christi, Flour Bluff, Tuloso-Midway, and Sinton)
  - **50%** first-generation college graduates, **80%** female, **50%** Hispanic/Latino
  - **90%** high school STEM teachers (Grades 9-12), **10%** middle school STEM teacher (Grades 6-8)
- **5 industrial advisors** participated in the 5 research projects
- **7 Seminars/Webinars/Workshops** were organized in each of the 2023 and 2024 summer programs

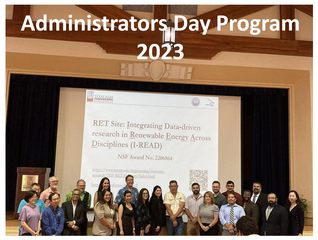

Seminar: 2023


Seminar: 2024


SpaceX Field Trip: 2023

- **2 Field trips** were organized during 2023 (SpaceX, and Texas A&M AgriLife Research and Extension Center-Corpus Christi) as well as 2024 (ExxonMobil facility at Gregory, Texas, and Texas A&M AgriLife Research and Extension Center-Weslaco) summer programs
- All the teacher participants did team poster presentation and team oral presentation sessions on the Final Day of the summer program (Administrators Day)
- In addition to the specific research outcomes for the 5 projects,
  - **11 course modules were developed during the 2023 summer program** (**5 course modules were implemented in the classroom**, issues such as the teachers assigned to a very different course, grade level, moved to administrator position, etc. were the key deterrent in implementing the remaining course modules. The teachers plan to implement these course modules in the current school year)
  - **13 course modules were developed during the 2024 summer program**
- **Two sessions were organized at the ME by the SEa conference** held on June 14, 2024, at Texas A&M University-Corpus Christi, where 4 Summer 2023 teacher participants presented
- A conference paper has been published and **a poster was presented by 2023 summer participant**, Daniel Garza, **at the ASEE Conference** in Portland, OR, June 23-26, 2024 (https://peer.asee.org/46717)

Field Trip: 2024



Administrators Day Program 2023

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