

STEERing a Systemic Path to Improved College STEM Teaching

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AAC&U Transforming STEM Higher Education

“Back to Broken?”

Friday November 3-5, 2022

Arlington, VA



**UNIVERSITY OF
SOUTH FLORIDA**



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Systemic Transformation of Education Through Evidence-Based Reforms (STEER)

- A National Science Foundation Funded Project
(\$3M/5 year, 2015-2022)
- Partnership between Hillsborough Community College and the University of South Florida
- Goal: Culture change to make evidence-based teaching expected and the norm for science, mathematics and engineering classes
- Anticipated outcome: enhanced student success in STEM
- **Multipronged approach** - faculty and graduate student professional development/support, policy and classroom space



Institutional Context

- Two large public higher education institutions:
HCC ~42,000 and USF Tampa ~42,000
(31,000 undergraduates)
- Both diverse:
 - HCC Hispanic serving institution
~30% Hispanic and
>20% African American or mixed race
 - USF >35% underrepresented groups
- Transfer students account for about 40% of USF students
 - 38% of STEM students are transfers with
30% (1,358) of those from HCC



STEER Leadership TEAM

Bob Potter (Chemistry and Director, Coalition for Science Literacy, Sr. Associate Dean Arts and Sciences) PI

Ruthmae Sears (Mathematics, College of Education, Associate Director Coalition for Science Literacy)

Scott Campbell (Chemical Engineering)

Tim Henkel (Integrative Biology and Director of Center for Innovative Teaching and Learning (CITL))

Hikmat BC (Physics, Associate Dean of Mathematics and Science Hillsborough Community College) Co-PI

Catherine Beneteau (Mathematics and Statistics)

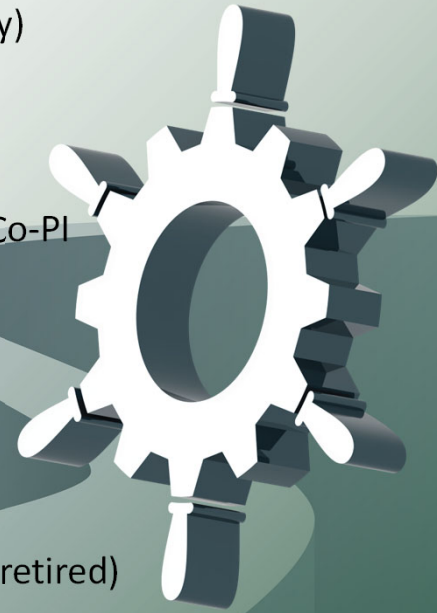
Peter Stiling (Integrative Biology) Co-PI

Mary Goodwin (Engineering)

Kelley Schuler (Program Manager STEER and Coalition for Science Literacy)

Gerry Meisels (Past Provost, founder of the Coalition for Science Literacy and the original STEER PI, retired)

Others Contributing: **Jennifer Lewis, Les Skrzypek, Gladis Kersaint, Kevin Yee, Jim Wysong and Danny Camacho**



STEER Initiatives

- Established an elite advisory board
- Two-year awareness building seminar series
- Departmental retreats and interdisciplinary retreats
- Curriculum alignment- HCC and USF
- Travel awards
- STEER Scholar awards
- Course Redesigns (departmental and individual)
- Peer Observation Program (POP)
- Peer Transfer Advising
- Graduate Teaching Assistants training
- STEERing Online Success in STEM (SOS STEM)
- Virtual Faculty Conversations on Teaching and Learning



STEER Advisory Board

*Many thanks for
your service!*



Dr. Shirley Malcom



Dr. Linda Slakey



Dr. George Kuh



Dr. Eric Banilower



Dr. Davis Jenkins



Dr. Adrianna Kezar



Dr. Jay Labov

Travel Awards and STEER Scholars

Travel to education focused sections of disciplinary meetings

- teaching related workshops (16)
- presentations on teaching innovations (22)

Awarded up to \$1000 (required departmental match)



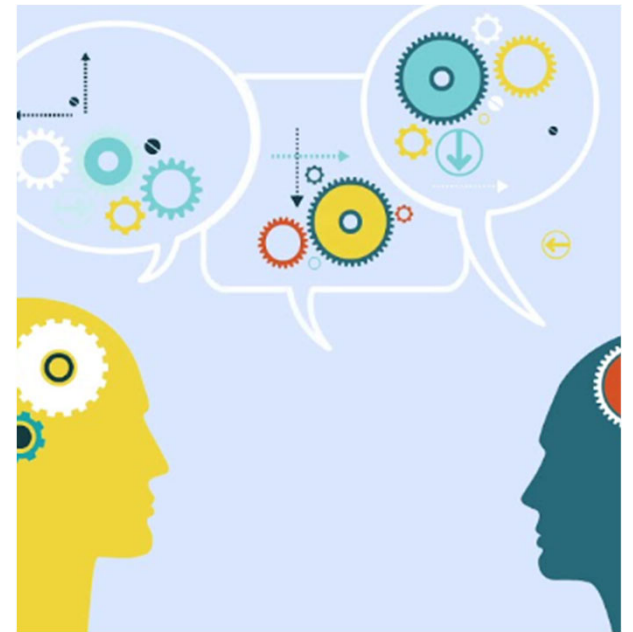
STEER Scholars

18 faculty recognized for effective teaching.

Awarded \$3000 as role models and ambassadors for effective teaching.

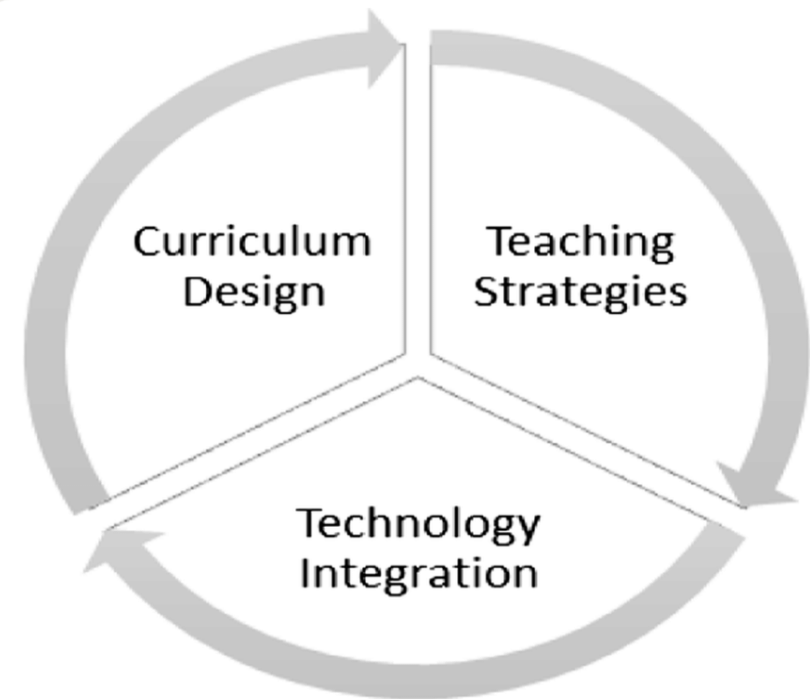
Peer Observation Program (POP)

- Low stakes approach (\$500 incentive)
- Interdisciplinary teams of three faculty
- Trained to focus on teacher-student and student-student interaction and providing helpful observations to their colleagues
- Observe each others' classroom with a debrief
- Together observe an experienced faculty member using EBT
- Submit a reflection paper on their experiences, and how it has changed, or may change, the way they teach
- 66 faculty took part over 4 years - most went on to submit course redesigns



Course Redesigns:

- Departmental: chair recommends tenured faculty and course, supported with TA and experienced mentor faculty
- Individual or team: Faculty propose course improvements describing needs and deliverables
- STEER leadership team selects (about ½ of proposals funded)
- \$3,000 awarded upon acceptance of report linking to deliverables
- Total of 51 improvement projects supported



STEERING Online Success - SOS STEM

Initiated Summer 2020 in response to the spring pandemic that forced all instruction online

- Faculty from all STEM departments participated, (31 USF; 14 HCC)
- Produced 10–15-minute videos of useful online stem teaching approaches
- Videos were curated for easy selection and use
- Teams of 3-5 from departments watched videos and presented to their faculty on what was available
- Team members became go to online support for other department members
- Videos have been viewed 1,931 times on YouTube as of August 2022.

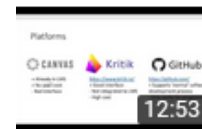
(<https://www.youtube.com/playlist?list=PLwAi4jFY-MEYPA6zKWh3GRREcG1MEUqeX>)



Deb Ghosh - taking a humanistic approach, Wacom pen, on 3 focus areas for moving online: - humanistic approach to inst communication - Interactive teaching with the Wacom pen for



Robert Connelly - Strategies for taking a flipped class online Online strategies that worked well moving to online instruction Gradescope for assessments and rubrics - especially for hand



Paul Rosen - Peer Feedback in STEM Using peer feedback to increase student engagement in STEM Platform comparison of Canvas | Github | Kritik. by Paul Rose



Kenyon Daniel - Thoughts and Ideas for taking a flipped co Taking a flipped course to fully online. Opportunities and cons Take Canvas Conferences to the next level with breakout room



Rasim Guldiken - Making Videos on iPad using Notability How to make videos on iPad using Notability.



Colbi Gemell - Cellular Processes Lab *Engaging students in synchronous group inquiry-based activi specific to Bio I lab in an online setting. These activities focus



Autar Kaw - Microsoft Forms as PRS This video shows you how you can use Microsoft forms as a personal response system (clickers). We take you through four steps - how to...



Kingsley Reeves 3 Tools for online teaching: Panopto, tablet/pencil, ... Panopto Cloud within Canvas - record a lecture and post to Canvas. iPad, Pencil and Notes - work equations, diagrams in real time. Easily saves f...



Teaching Assistants Training

- Capitalizing on the potential for TAs to improve STEM student success
- Resources and professional develop provided for all new science laboratory teaching assistants. (380 total over the grant period)
- Pre-term: Three half-day workshops reflecting on evidence-based and inclusive teaching strategies (active learning/EBT, classroom environment, classroom management, assessment, implicit bias, inquiry-based laboratory facilitation, questioning strategies, student wellness support and laboratory safety).
- Followed up with half-day workshops in fall and spring (focus on what students say they need)

Teacher Beliefs about Effective Science Teaching (TBEST)
Questionnaire (Smith, Smith, & Banilower, 2014)

Classroom Management Scenarios (The Academy for Teaching
and Learning Excellence, 2015)

Gallery walks – Participants shared ideas of means to facilitate
equity within lab settings

STEM Lab Instructor Identity Petal Conceptualization Map

Personal Reflections

Sample Activities

I am USF, You are USF, We are USF!



Significant Results

- **Involvement**

- 90% of introductory STEM courses use EBT approaches with more students being successful
- 47% (175/369) of faculty in the College of Engineering and School of Natural Science and Mathematics were involved with at least one STEER initiative and 26% engaged in more
- All ranks involved at USF: 52 professors, 40 associate professors, 20 assistant professors and 63 instructors
- At HCC 49% (44/85) have taken part in at least one initiative.
- **“The project has had a major change in instructional practice in STEM at both USF and HCC”
external evaluators report- Horizon Research**

- **Student Success:**

- Over the project period STEM degrees in Engineering, Mathematics and Sciences increased by 551 from 2,026, (34% of total degrees) to 2,577 (38%), a 27% increase in STEM degrees
- STEM degrees to underrepresented groups have increased by 185, (796 total degrees) increasing from 30 to 31% of STEM degrees in our target areas.

Lesson Learned

- Resources are essential for success (incentives work!)
- Knowledgeable, dedicated, and diverse leadership is necessary (provides more and better ideas and reaches and influences different constituencies)
- Leadership should meet regularly and follow a process of plan, do, reflect, and modify to have success.
- Flexibility and a willingness to harness serendipity improves outcomes
- Leadership should have influence among faculty as well as among administrators
- Regularly recognize, respect and reward faculty success in teaching improvements
- Building a “brand” of support for teaching innovation increases faculty involvement in new initiatives
- Leadership must be patiently, impatient since culture changes takes time



Thank you for coming!

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