

Lessons Learned: Successes and Challenges of Implementing a Systems Model for Improving Student Success & Student Retention

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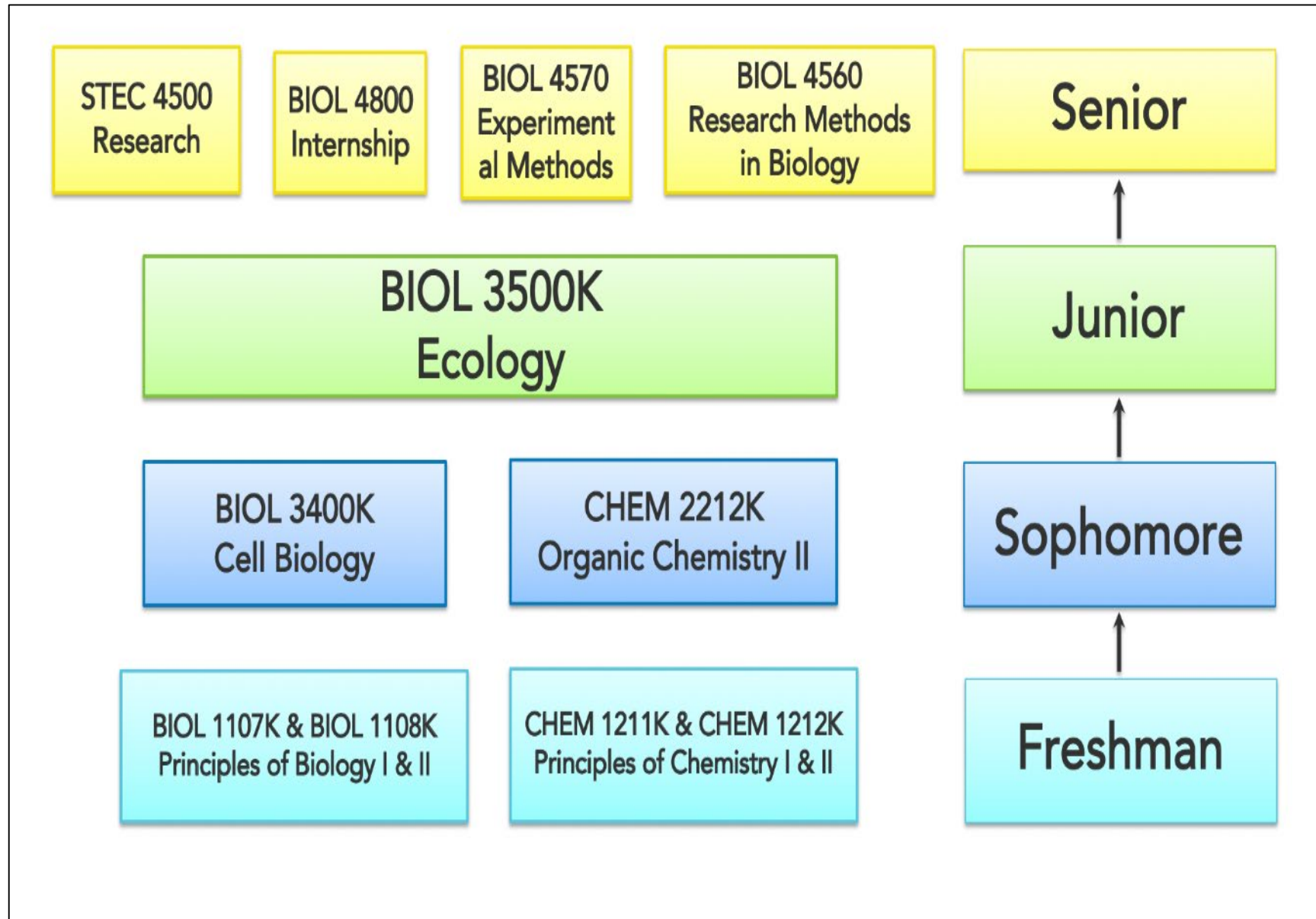
PLAN FOR OUR SESSION

- History behind our work
- Overview of our Systems Model
- Specific components of our model
- Successes & Challenges
- Key lessons learned & recommendations

OUR JOURNEY TO SYSTEMS THINKING

- Goals: Improve student retention, progress, and graduation rates
- The School of Science & Technology (SST) at GGC attracts a highly diverse student population
- Many students come from groups traditionally underrepresented in STEM education
- Disparity in diversity between the students we serve and those that we graduate
- GGC is a new institution; PUI; primarily teaching
- Lacked research labs
- Dean's vision: provide research opportunities for ALL student in SST
- Focus on embedding research into courses
- CUREs (Course-embedded Undergraduate Research Experiences)

4-Year Undergraduate Research & Creative Experiences Model



4-Year Undergraduate Research & Creative Experiences Model

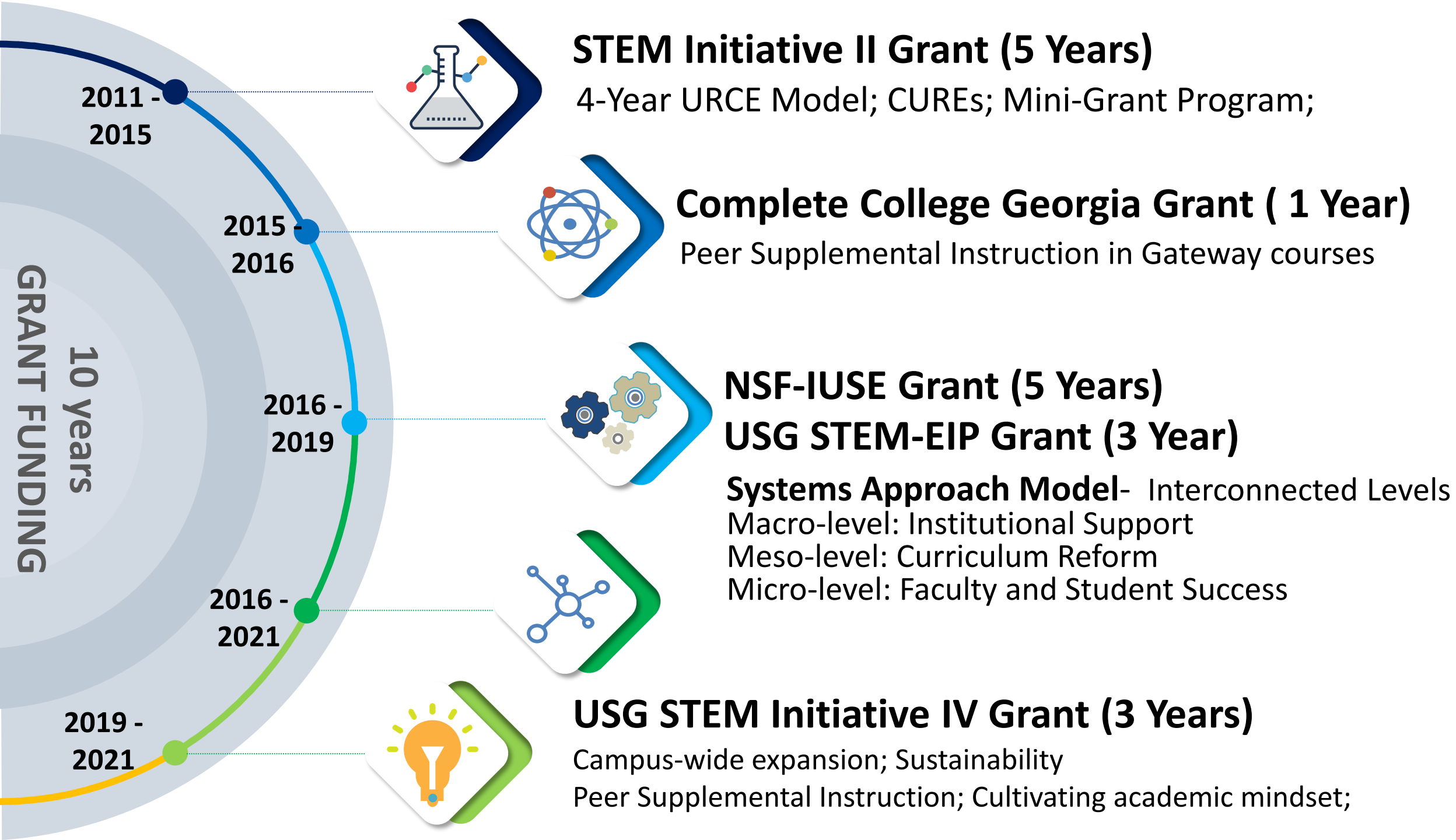
- **CUREs**

- **ALL** STEM majors get research experiences in each year of a 4-year degree program
- Embedded in required courses within each discipline
- Emphasize development & acquisition of STEM skills

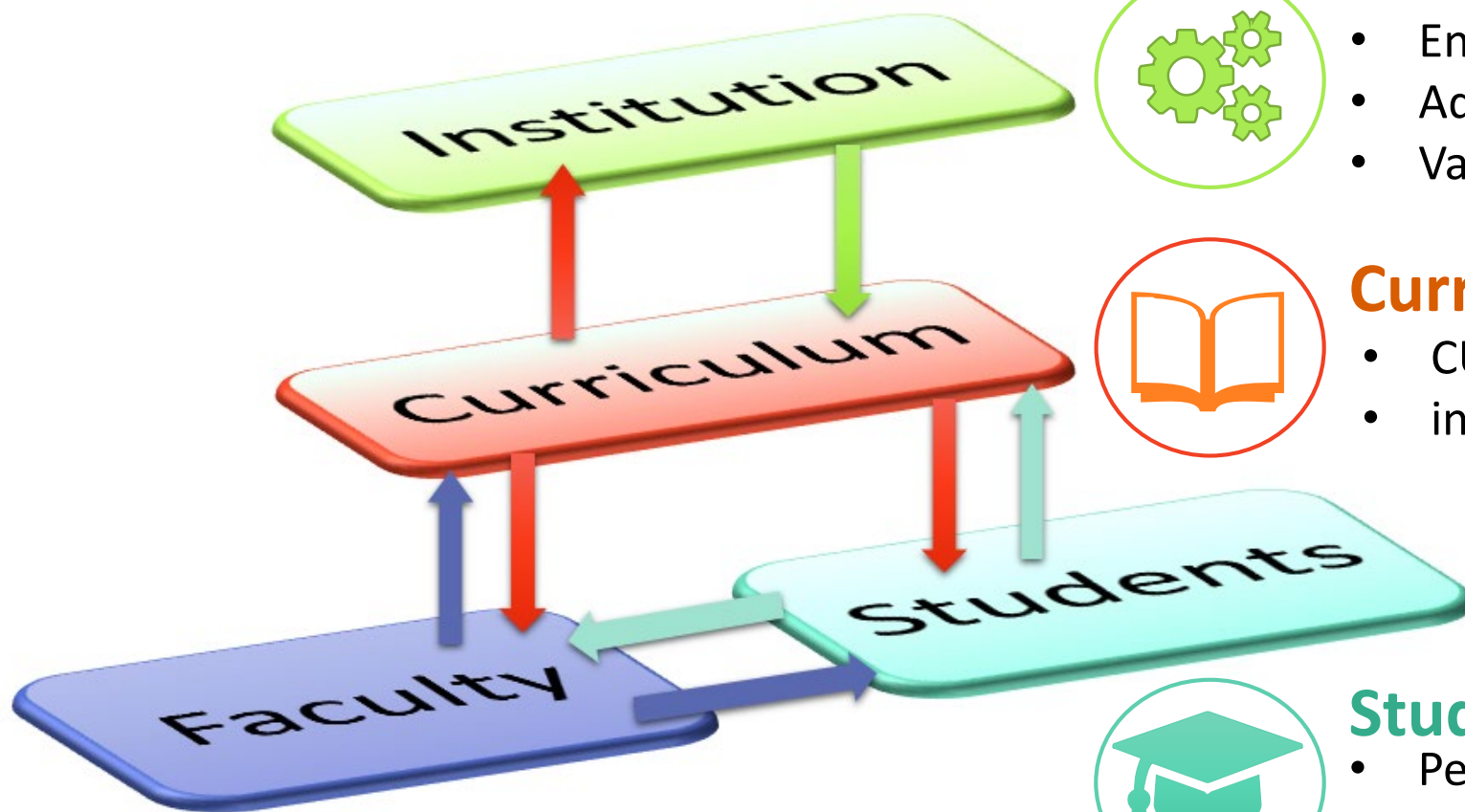
- **STEM Skills Embedded & Assessed in CUREs**

- Technical skills
- Experimental design
- Data analysis
- Scientific communication
- Critical thinking & problem solving





Institutional Model: Systems Approach



Faculty Development

- Training opportunities
- Faculty Learning Communities.



Institutional Support

- Encourages innovation,
- Adopts interventions for sustainability
- Values this work for promotion



Curriculum Reform

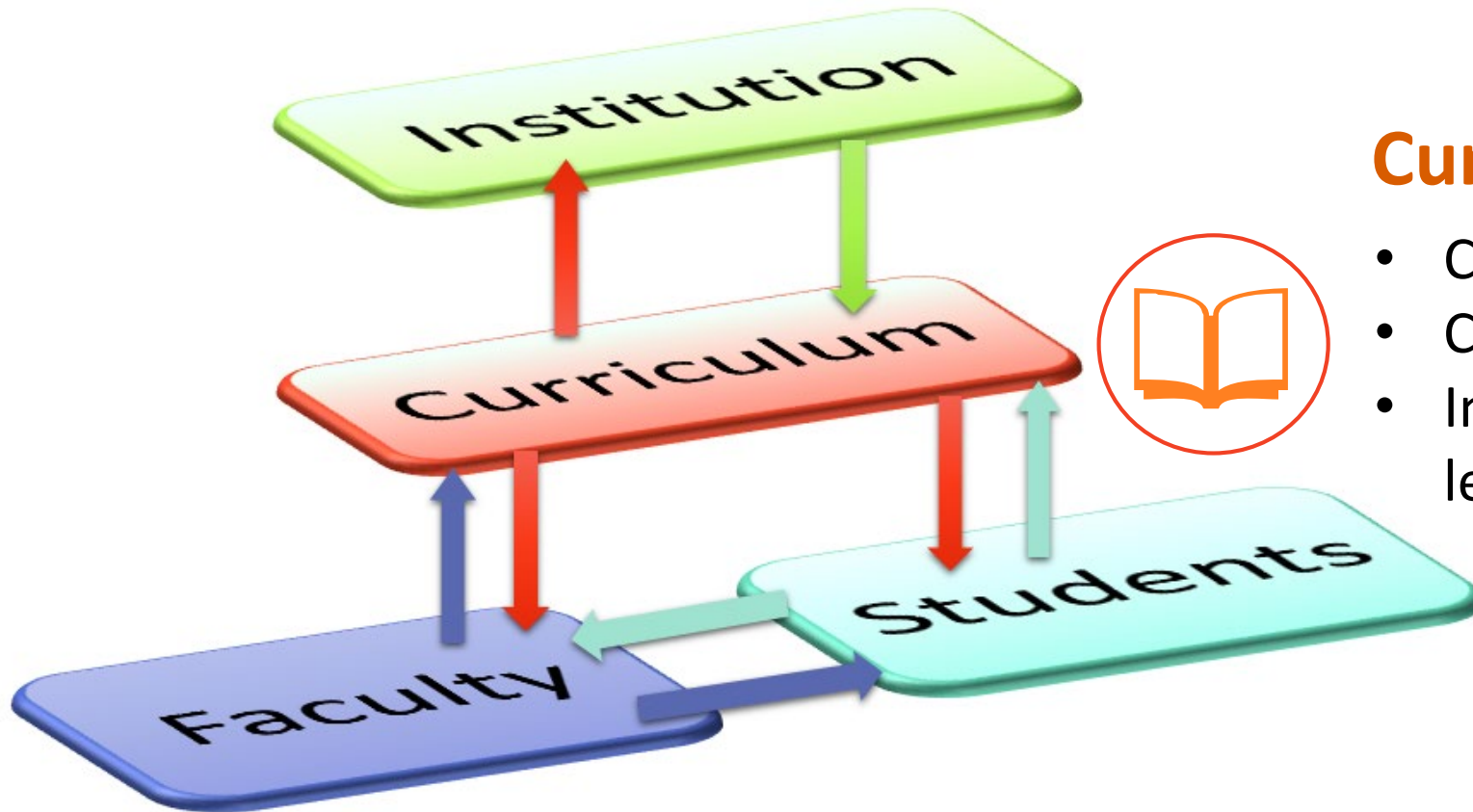
- CURE & STEM skills
- internships and experiential learning



Student Success

- Peer Supplemental Instruction
- Transferable leadership skills
- STEM Skills

Institutional Model: Systems Approach

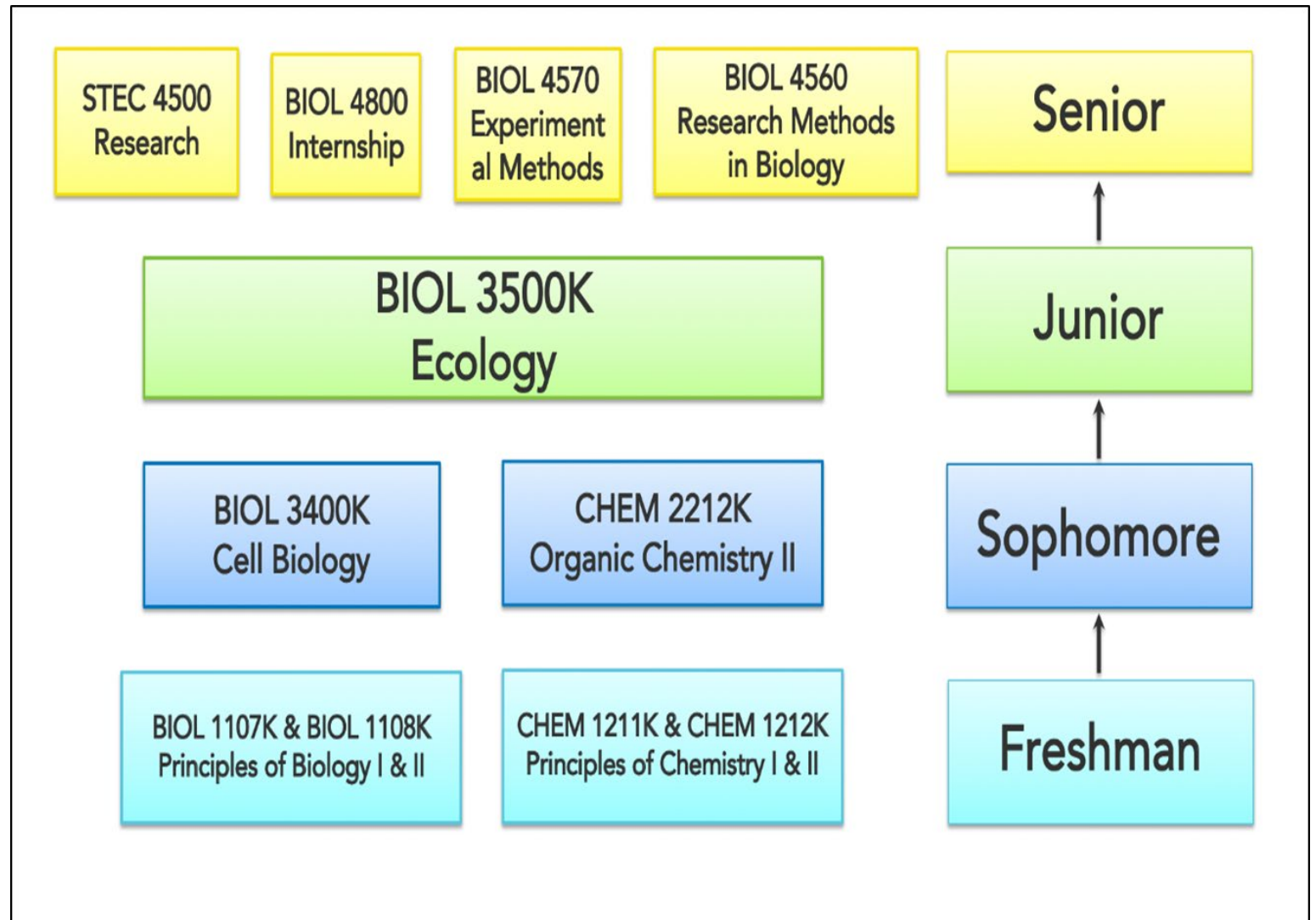


Curriculum Reform

- CUREs and the 4-YrURCE Model
- CUREs focus on STEM Skills.
- Internships and experiential learning

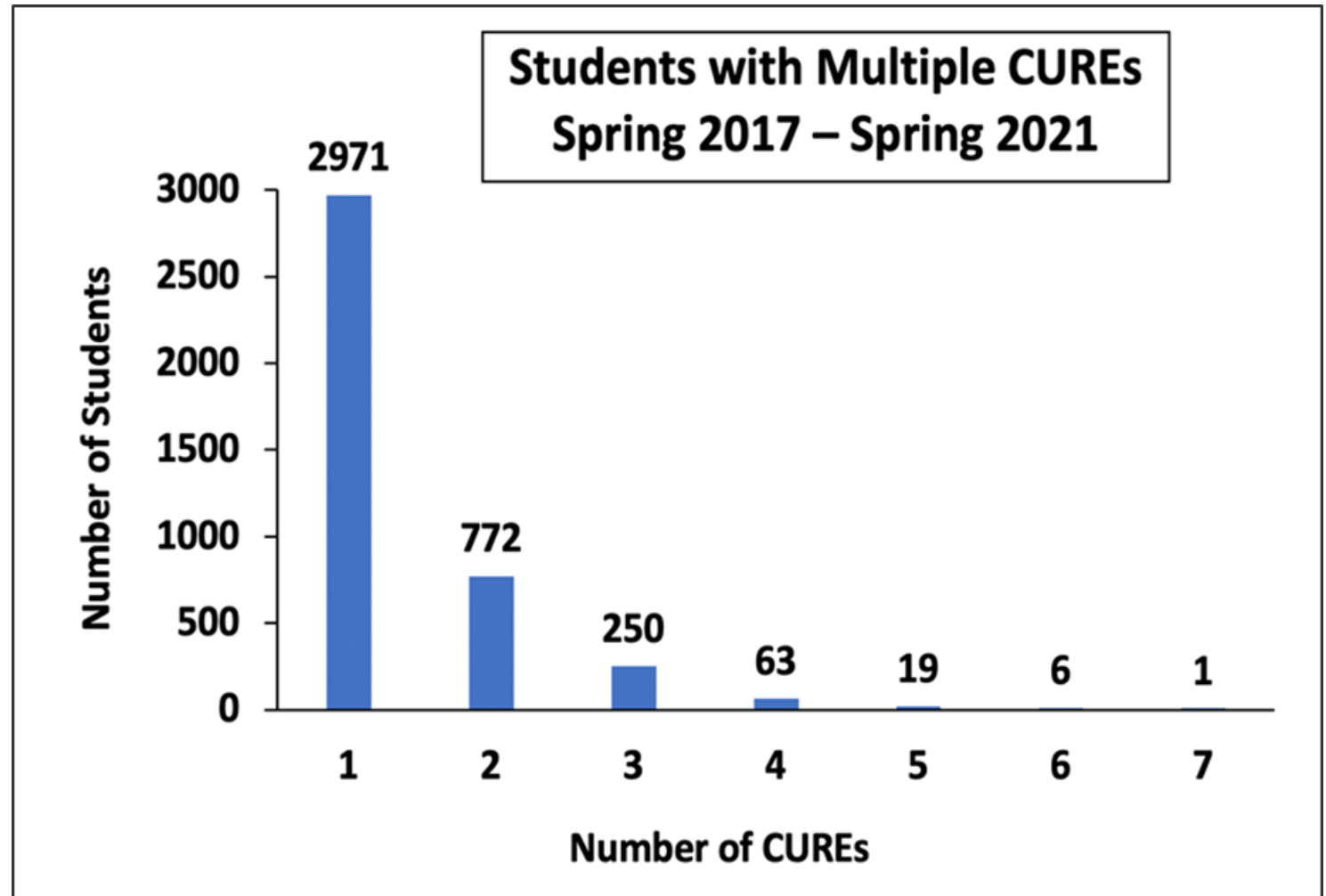
LESSONS LEARNED: “CURRICULUM-LEVEL” SUCCESSES

- 4-YrURE model
 - Easily adaptable



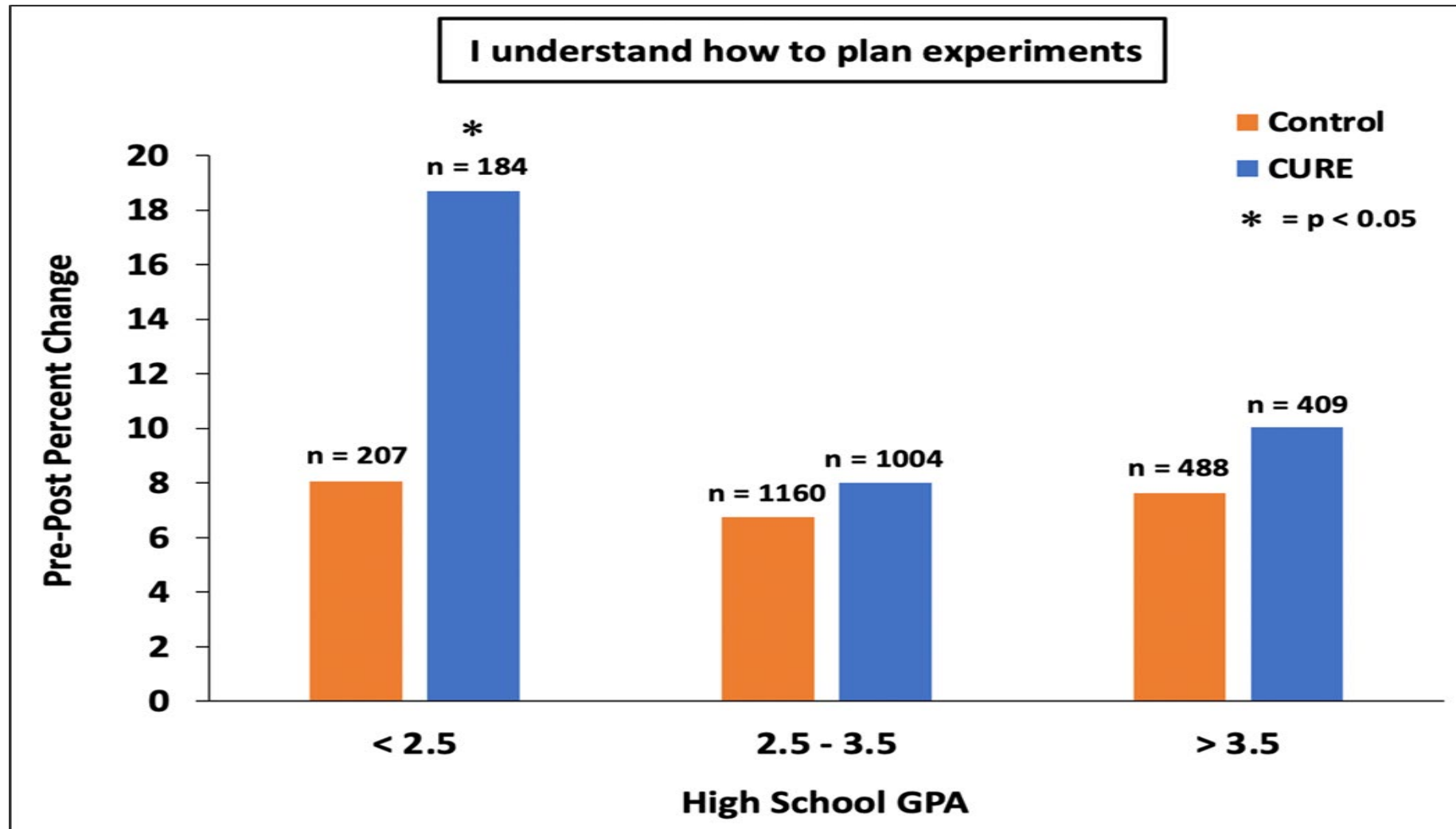
LESSONS LEARNED: “CURRICULUM-LEVEL” SUCCESSES

- Multiple CUREs
- Multiple Opportunities for mastering STEM Skills



LESSONS LEARNED: “CURRICULUM-LEVEL” SUCCESSSES

- More positive belief in self-efficacy (especially for underprepared students)



LESSONS LEARNED: “CURRICULUM-LEVEL” SUCCESSES

- Improved STEM skills
 - High faculty buy-in for CUREs
 - All STEM disciplines participated
 - CUREs are inclusive
 - CUREs are narrowing the achievement gap
-
- Poster Session: Course-embedded Undergraduate Research Experiences: A 4-year CURE curriculum model for closing the performance gap in under-prepared and under-represented groups in STEM fields.
 - **Thursday June 10 @ 3:40 pm EST**

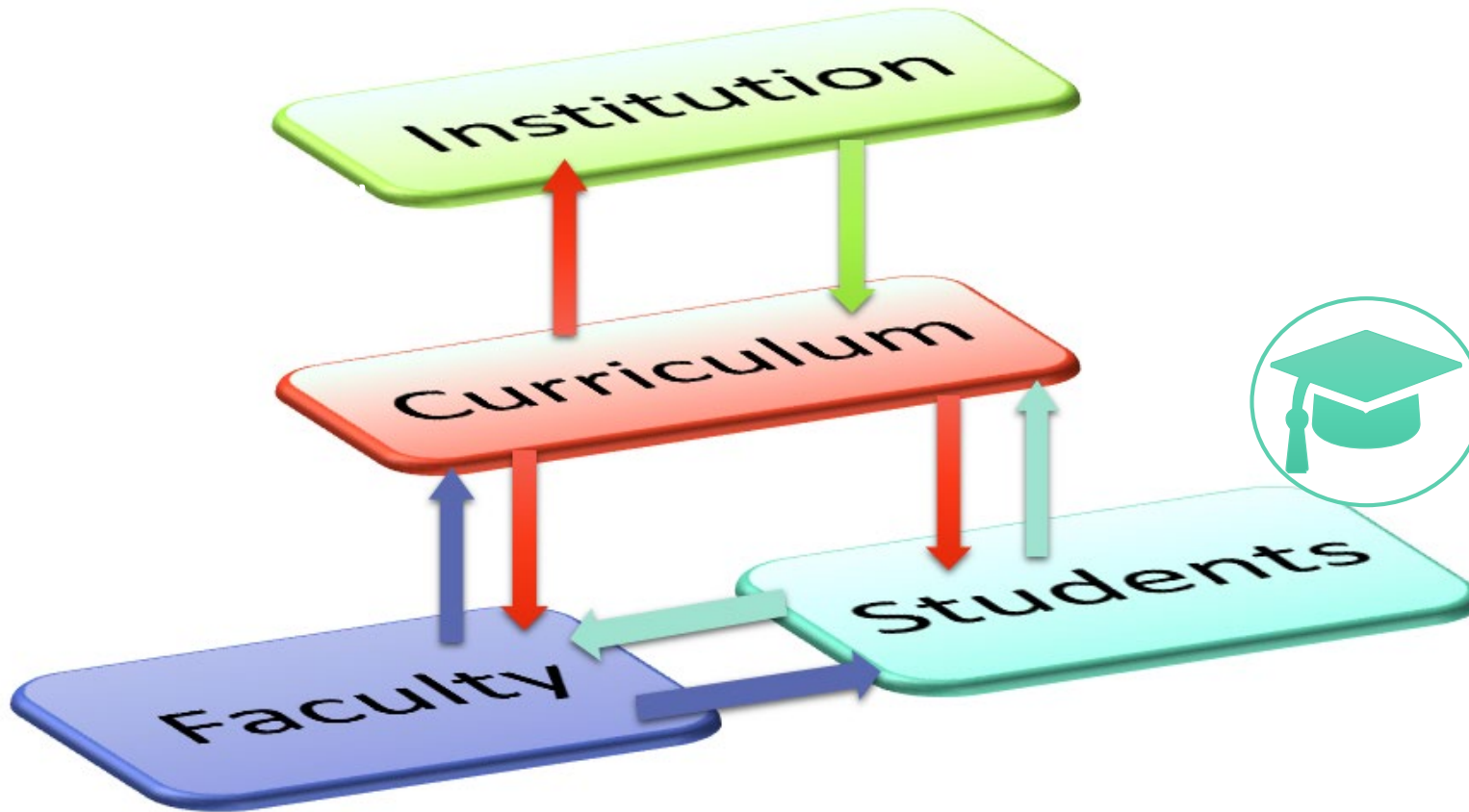


LESSONS LEARNED: “CURRICULUM-LEVEL” CHALLENGES

- Student grades may not be impacted
 - Consider STEM skills versus improved grades
- Faculty buy-in
- Interventions must be sustainable
- Data collection and analysis can be overwhelming!
 - We are still analyzing back-logged data
- Consider quantitative and/or qualitative data
- Have clear research questions
- Have a clear assessment plan
- Student fatigue with surveys



Institutional Model: Systems Approach

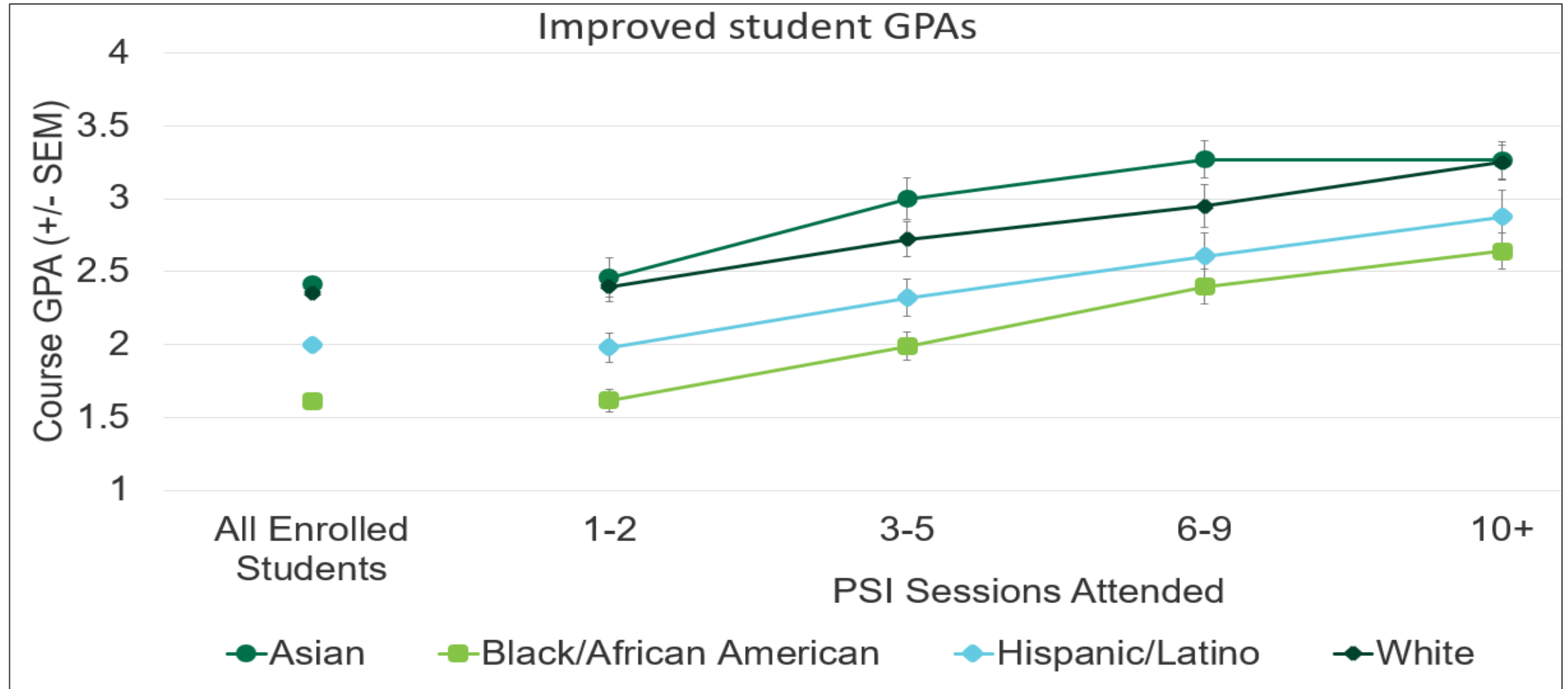


Student Success

- Peer Supplemental Instruction
- Transferable leadership skills
- STEM skills

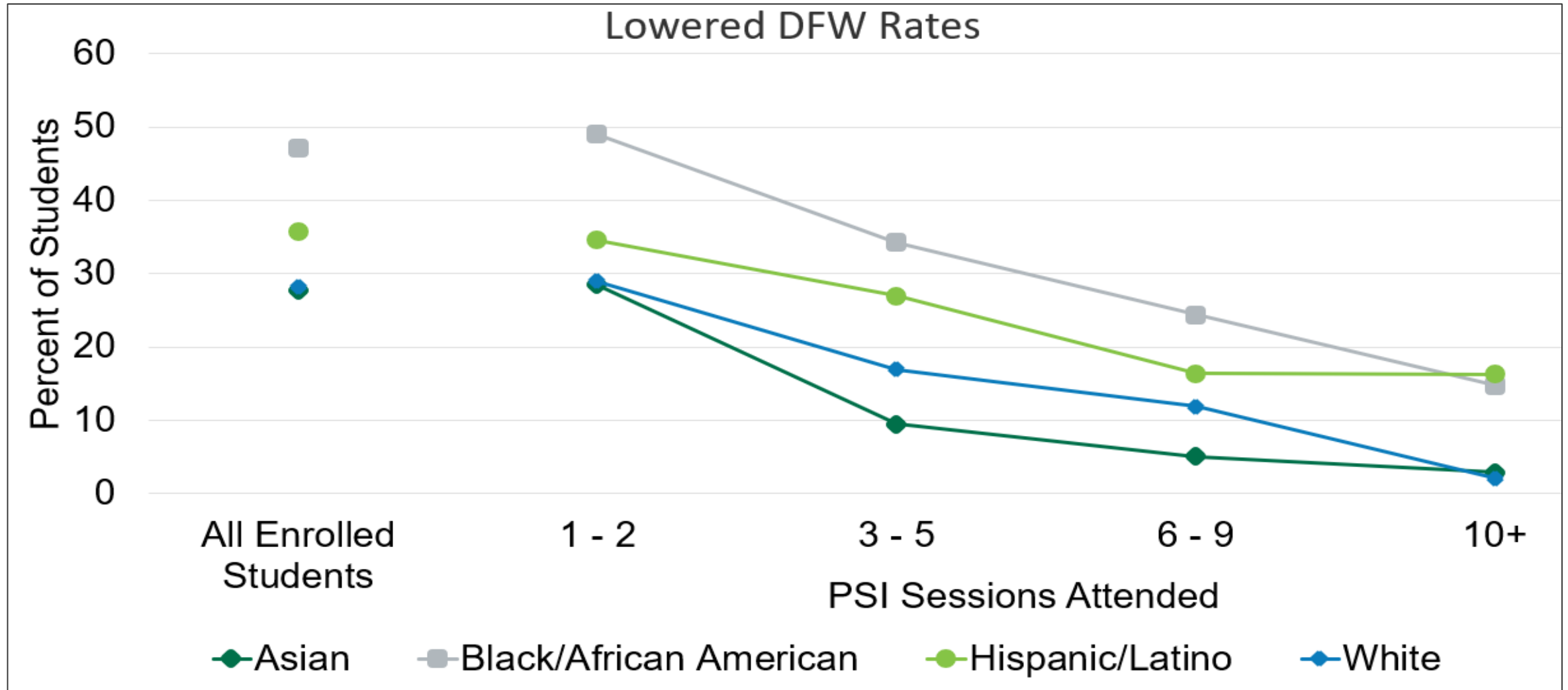
LESSONS LEARNED: “STUDENT-LEVEL” SUCCESSSES

- PSI improved student GPAs



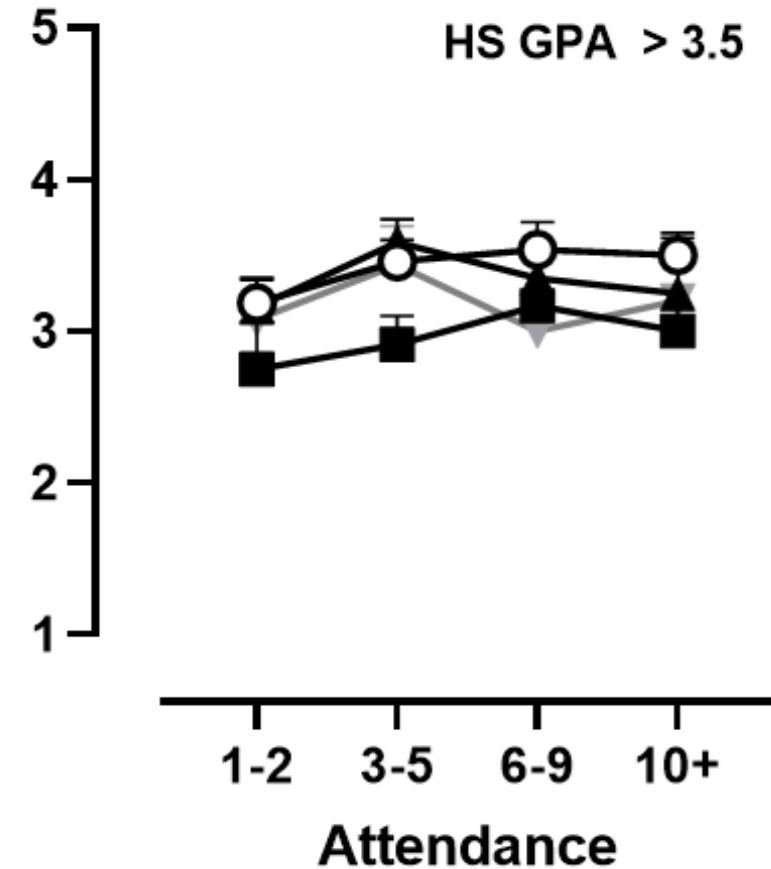
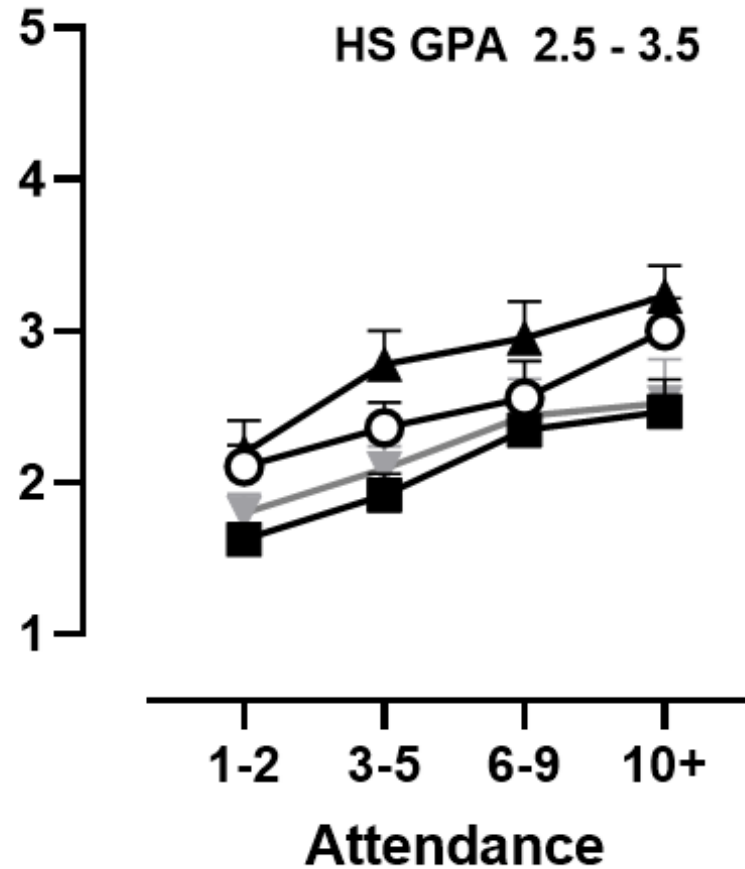
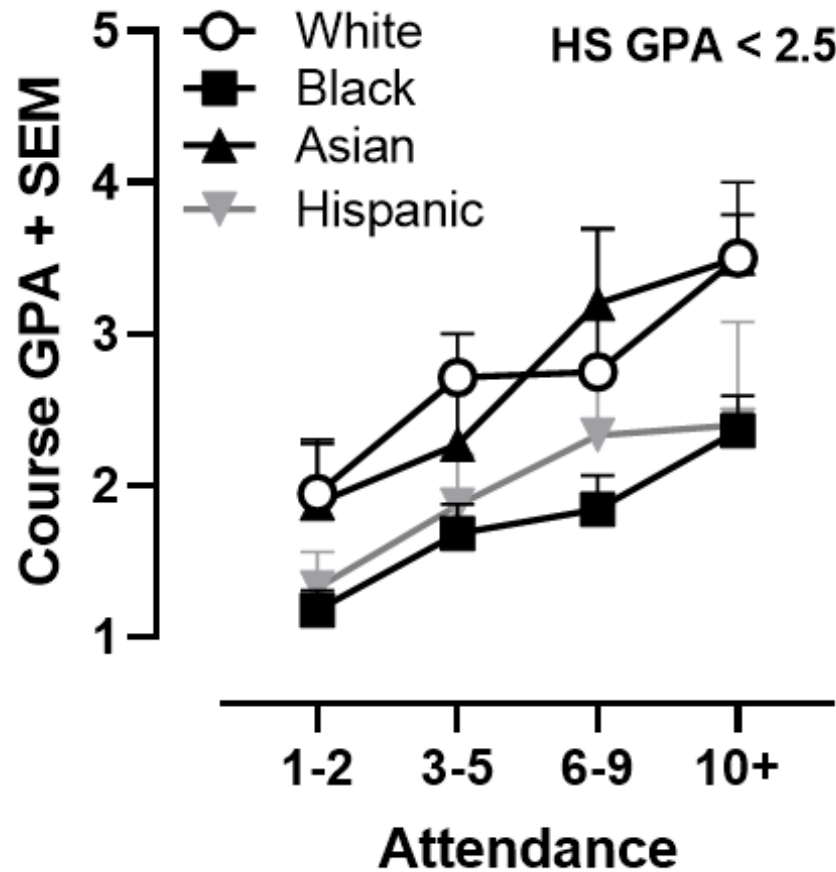
LESSONS LEARNED: “STUDENT-LEVEL” SUCCESSES

- PSI lowered DFW rates



LESSONS LEARNED: “STUDENT-LEVEL” SUCCESSES

- Least prepared students received greatest benefit



LESSONS LEARNED: “STUDENT-LEVEL” SUCCESSES

- Narrowed achievement gap for groups underrepresented in STEM
- PSI Student Leaders developed career competency skills
- Builds mentoring relationships between PSI Student Leaders and PSI faculty



LESSONS LEARNED: “STUDENT-LEVEL” CHALLENGES

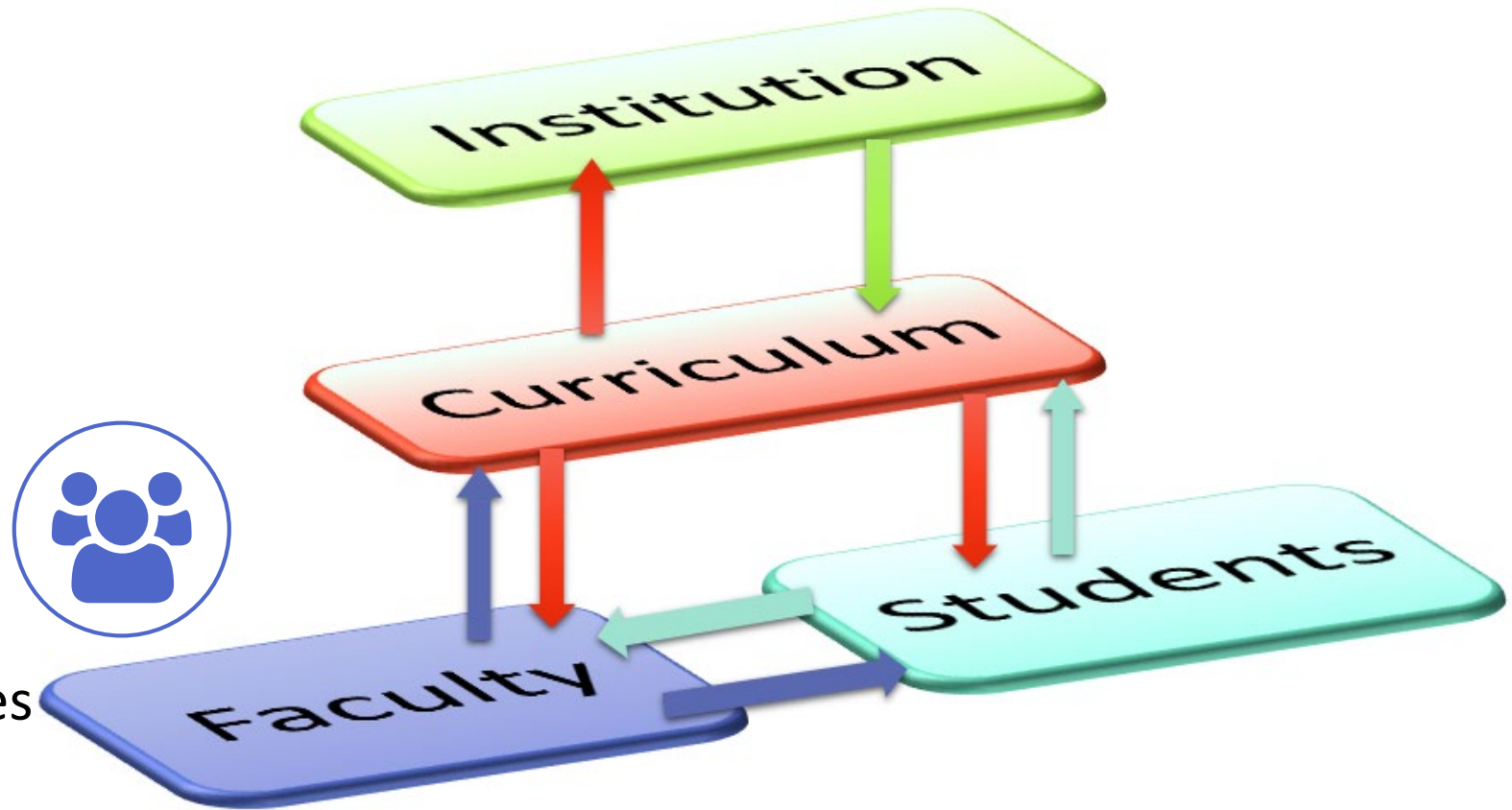
- How best to institutionalize PSI to support program needs, leader wages, training, etc.
- Finding permanent, dedicated spaces for 40+ sessions/week
- Student buy-in & ways to encourage attendance
- Ways to promote inclusivity and sense of belonging.
- Recognition for faculty’s time and effort
- Creating a PSI College Committee to coordinate leader training, mentoring, etc.
- Allowing advanced PSI leader registration



Institutional Model: Systems Approach

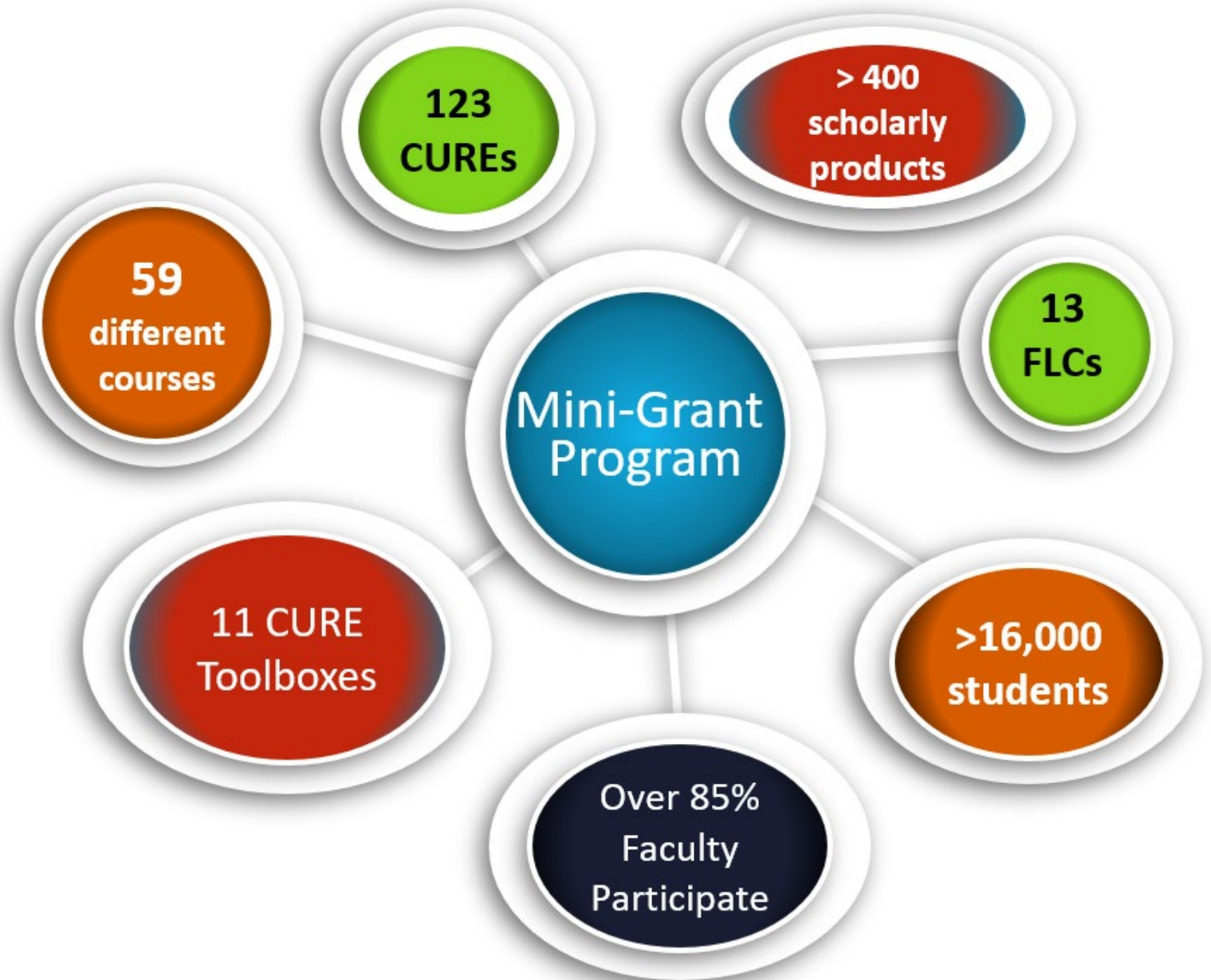
Faculty Development

- Training opportunities
- Faculty Learning Communities



LESSONS LEARNED: “FACULTY-LEVEL” SUCCESSES

- Mini-Grant Program- key success
- Curricula are student-centered
- Improved pedagogical skills (Mobile Summer Institutes)
- Formed faculty Learning Communities
- Increased interdisciplinary collaborations
- Scholarly products
- Counts for promotion

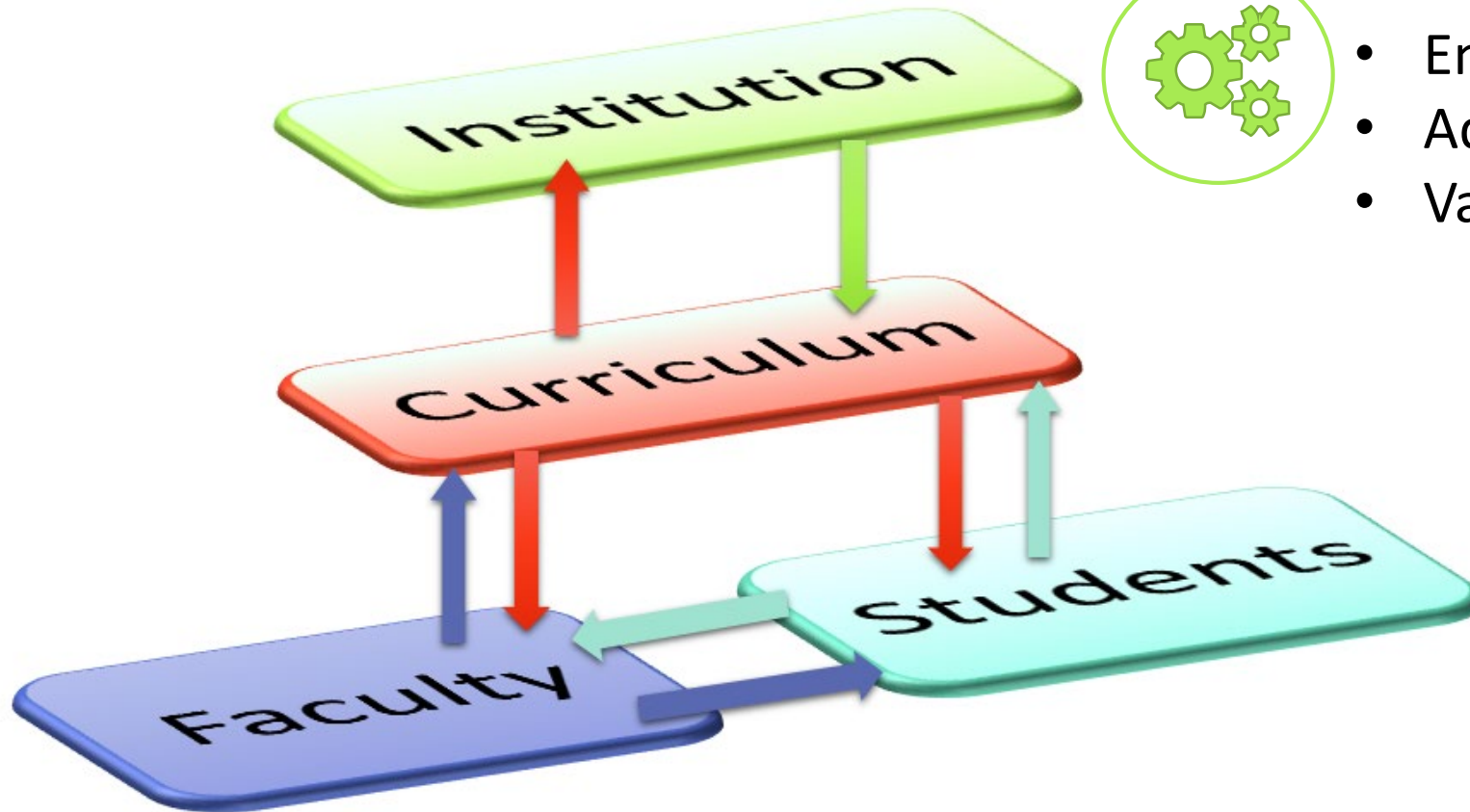


LESSONS LEARNED: “FACULTY-LEVEL” CHALLENGES

- Some faculty are still skeptical
- Unfamiliar with education research
- Strong interest in bench research
- Faculty burn-out



Institutional Model: Systems Approach



Institutional Support

- Encourages innovation,
- Adopts interventions for sustainability
- Values this work for promotion

LESSONS LEARNED: “INSTITUTION-LEVEL” SUCCESSES

- CUREs sustained in SST
- Model used at other institutions
- PSI is being institutionalized
- Increased student retention
- Possible increase in graduation rates
- Administrative support
- Institutional Research



LESSONS LEARNED: “INSTITUTION-LEVEL” CHALLENGES

- Institutional policies
 - Complex processes
 - Constant changes
- Administrative changes
- IRB- consider your research questions
- Lack of centralized “STEM Center”
- Grants office & policies



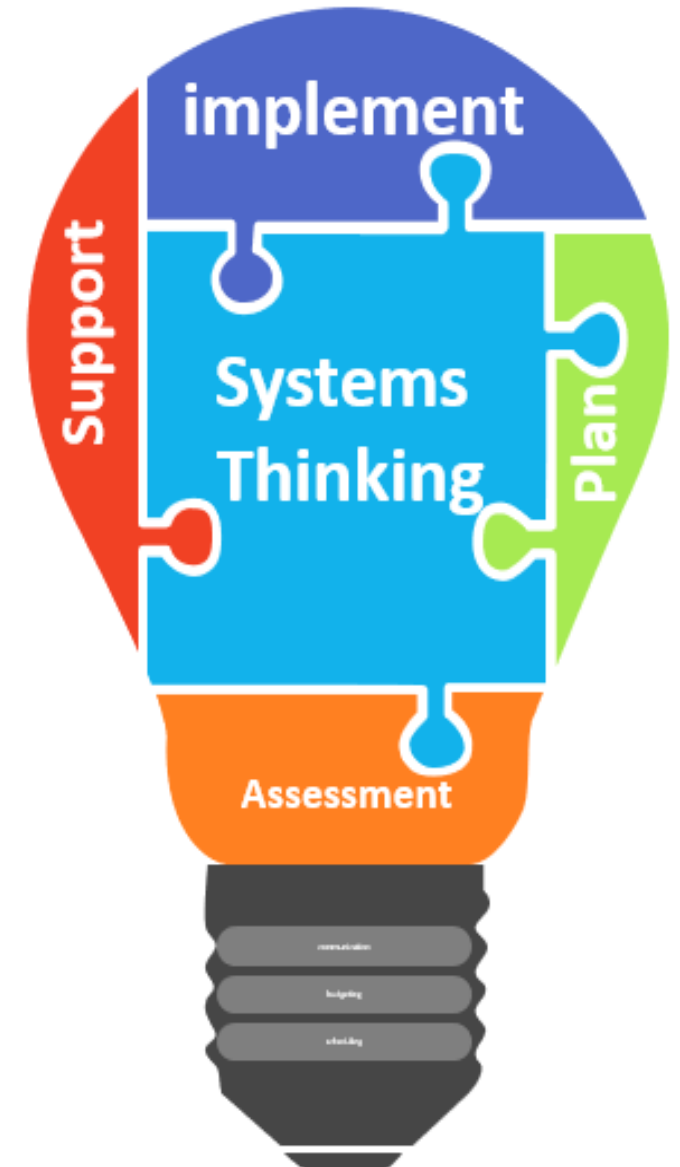
LESSONS LEARNED: OTHER TAKE-AWAYS

- Invest time in analyzing key contextual factors
 - What factors are facilitators?
 - What factors are barriers?
- Think big- it takes a village! Be innovative!
- Make sure your institution is supportive of your goals and strategies
 - Course releases
 - Support a mini-grant program
- External funding helps!
- Think sustainability!!



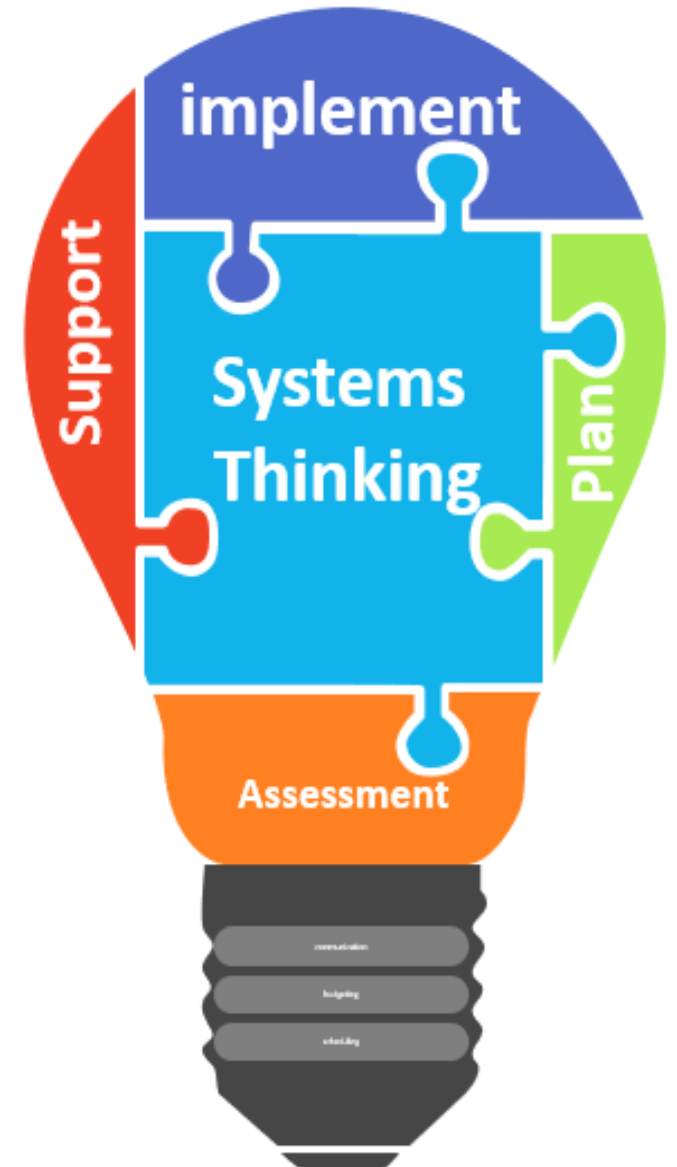
LESSONS LEARNED: OTHER TAKE-AWAYS

- Communication is important- at all levels
- Understand your institutional policies...constantly!
 - It can limit innovation and dampen enthusiasm
- Start with incremental change
 - Focus on Department/School/College as pilot projects
- Involve faculty
 - buy-in is important



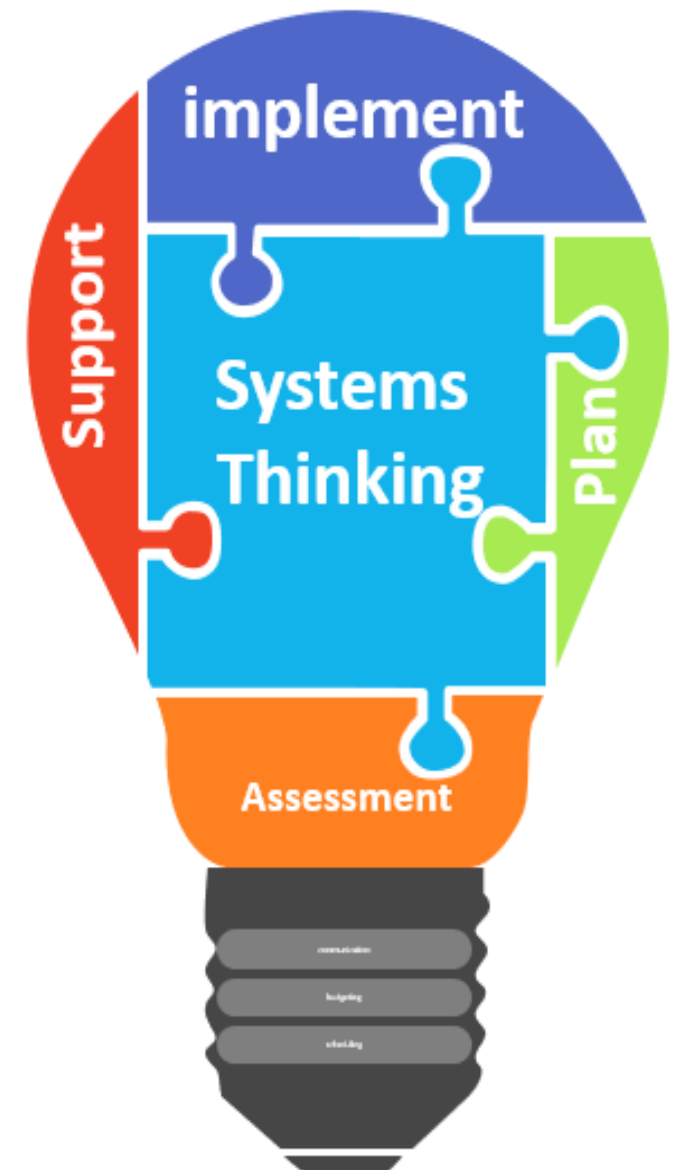
LESSONS LEARNED: OTHER TAKE-AWAYS

- Select a collaborative, interdisciplinary team with some experience
- Include someone familiar with education research
- Consider a statistician
- Be clear on duties and team work
- Be clear about data collection and data analysis
- Be clear about publications
- Consider how to incentivize stakeholders
 - Link to tenure & promotion
- Showcase your faculty's work (STEM Symposium)



LESSONS LEARNED: OTHER TAKE-AWAYS

- Make friends with your Institutional Research Office
- Make clear and detailed assessment & evaluation plans
- Learn from others: models can be easily adapted
- Constantly monitor and adjust to changing situations
- Consider ways to promote inclusivity and sense of belonging.
- Use grant funding to leverage a small percentage of institutional funding support.
- Use program data to garner administrative support (Dean, Provost, President) to leverage funds for your program.



Awong-Taylor, J., A. D'Costa, G. Giles, T. Leader, D. Pursell, C. Runck, and T. Mundie. (2016). *Undergraduate Research for All: Addressing the Elephant in the Room*. Council on Undergraduate Research, CUR Quarterly, Fall 2016 issue Vol 37, No 1.

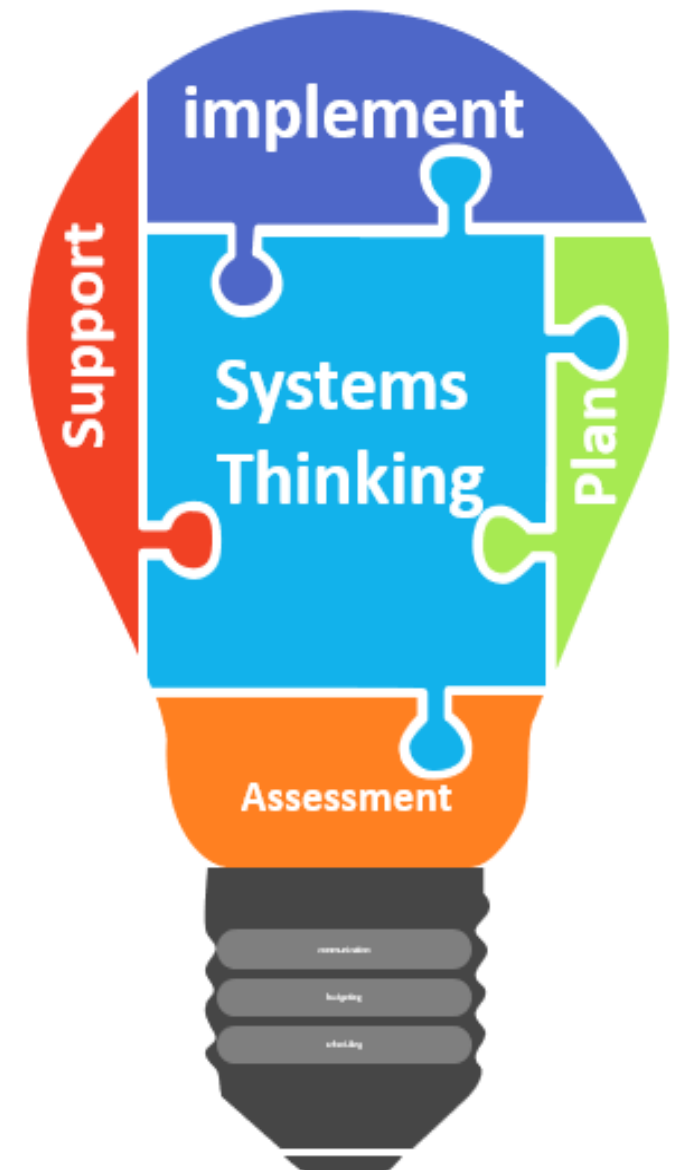
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Achat-Mendes, C., Anfuso, C., Johnson, C., Shepler, B., Hurst-Kennedy, J., Pinzon, K., Simmons, R., Savage, J., Dekhane, S., Sudduth, E., D'Costa, A., Leader, T., Pursell, D., Runck, C., Awong-Taylor, J. 2019. Learning, leaders, and STEM skills: Adaptation of the supplemental instruction model to improve STEM success and build transferable skills in undergraduate courses and beyond. *Journal of STEM Education: Innovations and Research* Volume 20 (2): 14-23.

<https://www.jstem.org/jstem/index.php/JSTEM/article/view/2418>

Awong-Taylor, J., Runck, C., Mundie, T., D'Costa, A., Pursell, D., Leader, T., Achat-Mendes, C., Anfuso, C., Moon, N.W. (2018). *Engendering Faculty and Student Engagement in STEM Education: An Institutional Model*. December 12, 2018 Issue of Scientia. DOI:

<https://doi.org/10.26320/SCIENTIA287>. <https://www.scientia.global/engendering-faculty-and-student-engagement-in-stem-education-an-institutional-model/>



Questions? Comments?



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