Framework of Undergraduate Research Experience Participant Gains Linked to Mentoring

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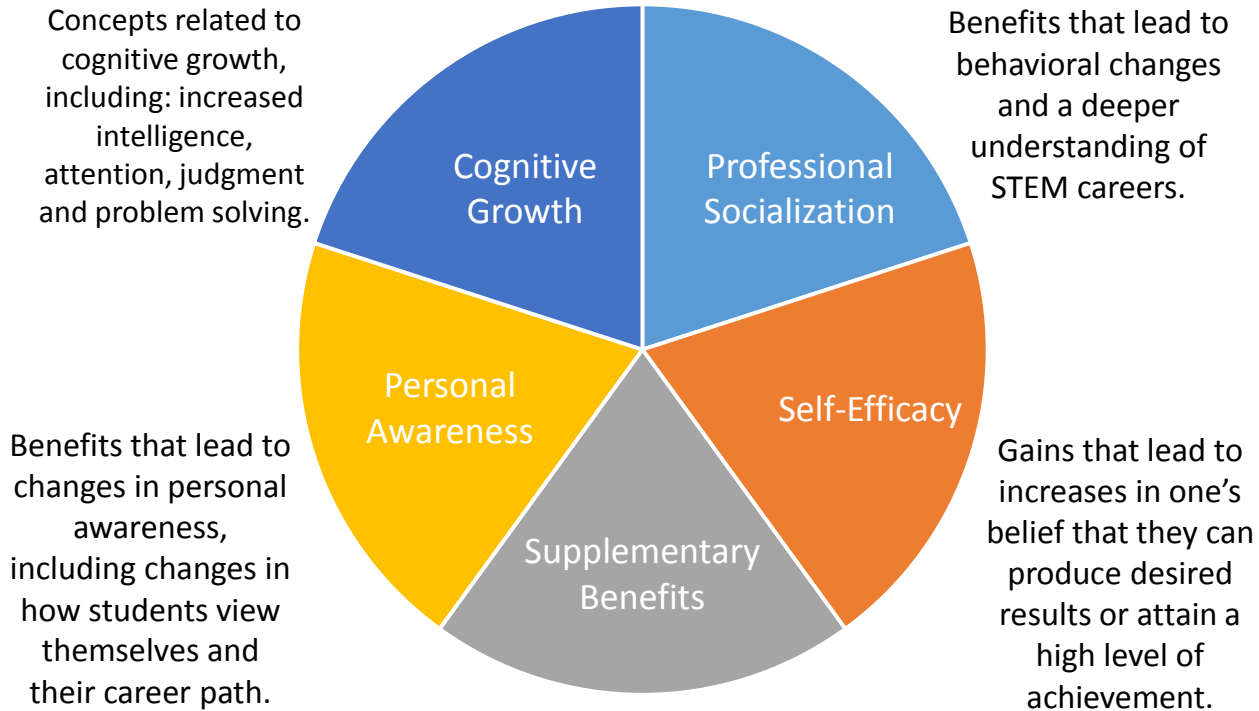
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Introduction

- Undergraduate Research Experiences (UREs)

- Broader role of UREs in offering future graduates and workforce employees knowledge & skills

- Student gains framework

- Evaluation and assessment of URE programs and projects

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URE Participant Gains Framework

Concepts related to cognitive growth, including: increased intelligence, attention, judgment and problem solving.

Benefits that lead to behavioral changes and a deeper understanding of STEM careers.

Cognitive Growth

Professional Socialization

Personal Awareness

Self-Efficacy

Supplementary Benefits

Benefits that lead to changes in personal awareness, including changes in how students view themselves and their career path.

Gains that lead to increases in one's belief that they can produce desired results or attain a high level of achievement.

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Supplementary Benefits

- Networking opportunities

- Peer-mentor connections

- Publications

- Recommendation letters

- Resume enhancement

- Increase in quality of coursework

- Positive impacts for underrepresented populations

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URE Program Evaluation

- Types of evaluation

- Data collection methods

- Examples

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Types of Evaluation

➤ Implementation Evaluation

   (Has the project been implemented as planned?)

➤ Formative Evaluation

   (What is working well and what needs improvement?)

➤ Summative Evaluation

   (Was the project a success?)

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Formative Evaluation

- Are the participants moving toward the anticipated goals of the project?
- Which of the activities and strategies best aid the participants in moving toward the goals?
- How can the project be improved?
- How can challenges be resolved?

Summative Evaluation

- Was the project successful?
- Did the project meet the overall goals?
- Did the participants benefit from the project?
- Were the results worth the project's cost?
- Were there unintended outcomes?

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Using the Participant Gain Framework to Evaluate URE Programs and Projects

- Pre-/post-survey items
- Individual and focus group interview questions
- Rubrics
- Student videos
- Alumni survey

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LAR REU Pre-/Post-Interview Questions

Sample Pre-REU Questions

- Do you feel confident in your abilities to perform the necessary tasks required for this program (i.e. journal research, experiment planning, using equipment, writing and presenting)? **(Self-Efficacy)**

- What are your plans after you finish your undergraduate degree? **(Personal Awareness)**

- What aspects of the scientific method do you think you would be comfortable working on independently? **(Professional Socialization)**

- If you were talking to a prospective employer about this REU program, what would you want to tell them you accomplished? **(Professional Socialization, Self-Efficacy, Cognitive Growth, Personal Awareness, Supplementary Benefits)**

Sample Post-REU Questions

- What do you think the most difficult task in research is? What is the easiest? **(Professional Socialization, Cognitive Growth)**

- Can you give any examples of experiences you had that made you feel successful or confident with your research? Unsuccessful/Less confident? **(Self-Efficacy)**

- Did the REU affect your decision to go to grad school? If so, in what ways? **(Personal Awareness)**

- Are there certain components of the Scientific Method you think you would be more comfortable working on independently and other components you would feel more comfortable if you were given guidance from an advisor? **(Professional Socialization, Self-Efficacy)**

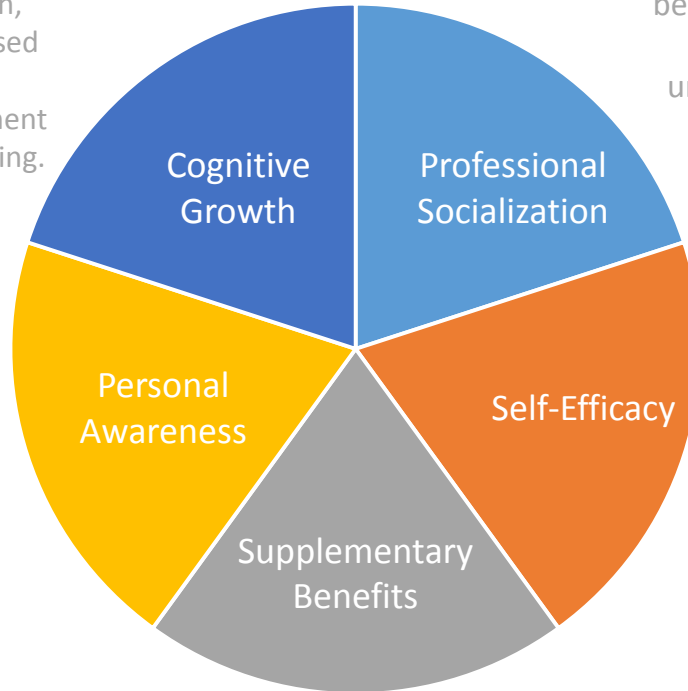Contacts: jlebeau@wsu.edu
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Sample Survey Items

- The LAR REU Program…
  - encouraged me to **pursue a career in science or engineering**.
  - provided me with **knowledge and skills necessary to pursue a career** in science or engineering.
  - provided me with skills necessary to **prepare for graduate school**.
  - gave me **confidence to know that I could succeed in graduate school** if I chose to attend.
  - taught me **how to write a research question**.
  - taught me **how to gather the evidence** necessary to evaluate a scientific hypothesis.
  - taught me **how to communicate** my area of interest to someone who is not in the same field.
  - gave me the opportunity to **collaborate on a research project with a faculty member** from a field other than my own.

- Open-ended items
  - Did the REU program impact your level of preparation and/or success in reaching your educational goals? If so, please explain in what ways. If not, please explain how the REU could have made more of an impact.

  - Did the REU program impact your level of preparation and/or success in reaching your career goals? If so, please explain in what ways. If not, please explain how the REU could have made more of an impact.

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Developing UREs that Promote Student Gains

- Begin with the end in mind!

- Align program development and implementation with evaluation

- Align goals, objectives, activities, and measurement

- Consider technical and non-technical ways of amplifying the mentor-mentee relationship to bolster gains in the Framework

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Pie chart segments:
- Cognitive Growth
- Professional Socialization
- Self-Efficacy
- Supplementary Benefits
- Personal Awareness

- ■ Hierarchical or dual mentoring
- ■ Regular meetings
- ■ Program admin role
- ■ Meaningful research experiences
- ■ Interested faculty (buy-in)

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Summary & Conclusions

- Evaluation can be used to identify opportunities for continuous improvement – and to better understand the program impact or effectiveness

- Mentees and mentors benefit from a well-designed program that aligns with evaluation

- Participant Gain Framework can be used to reach students from various backgrounds and experience levels

- Various methods of assessment allow for richer data and programming

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Thank you! Questions?

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