

Undergraduate Research Faculty Learning Community

Final Report

June 29, 2020

FLC Participants:

Sara Evans (coordinator) – Sociology & Criminal Justice, CHSS

Yuri Feito – Exercise Science and Sport Management, CHHS

Rongkai Guo – Software Engineering and Game Design Development, CCSE

Tsai-Tien Tseng – Biology, CMS

Jennifer Willard – Psychology, CHSS

Ayse Tekes – Mechanical Engineering, SPCEET

Jeffrey Yunek – School of Music, COTA

Evelina Sterling (Ex Officio) – Sociology & Criminal Justice, Associate Dean of Research, CHSS; Office of Research

Amy Buddie (Ex Officio) – Director of Undergraduate Research, Office of Research

Background Information and Purpose:

Undergraduate research is an important component of the KSU student experience. Engagement in research as an undergraduate student is considered a High Impact Practice (HIP) and is a component of the current Quality Enhancement Plan (QEP). Students who participate in research develop important skills including oral and written communication, leadership, problem-solving, and the ability to understand scientific findings and analyze literature critically. Additionally, undergraduate students who engage in research tend to have greater satisfaction with their major, increased confidence, higher graduate rates, greater likelihood of being accepted to post-baccalaureate program, and clearer career goals. Faculty may also benefit from incorporating undergraduate students in their research. Students can be trained to assist in many important tasks associated with research including conducting literature searches, developing study materials, collecting data, and analyzing and interpreting data.

Although there are clearly benefits for both faculty and undergraduate students to collaborate on research projects, many faculty members express limited experience or have only a singular perspective on how to work with undergraduate researchers. Faculty typically rely on the models that they were exposed to in graduate school and may have had few opportunities to reflect on the best practices related to undergraduate learning and/or strategies that make this collaboration more efficient. Some faculty are lucky enough to stumble upon a CETL workshop

or a senior faculty member willing to serve as a mentor in promoting undergraduate research; however, many faculty end up engaging in a time-consuming trial and error process as they try to start and maintain research projects involving undergraduate students, turning many off of undergraduate research all together.

The purpose of this FLC was to build a resource guide that addressed challenges identified by the UGR focused FLC in 2018-2019. Most importantly, we compiled a detailed set of recommended strategies and solutions for successful undergraduate research will be provided that will be easily utilized by faculty across KSU. This information is included below and will be posted to the KSU QEP website: <https://engagement.kennesaw.edu/definitions.php>. Additionally, due to the multi-disciplinary nature of this FLC, the information and any other results will be shared through university-wide workshop and/or presentation in the 2020-2021 academic year. The details regarding this presentation/workshop are pending given the current circumstances but will be held virtually if necessary.

As mentioned above, one of the barriers to engaging in undergraduate research is lack of information leading to a much greater time commitment for individual faculty members who want to work with undergraduate students. Given that the current QEP “It’s About Engagement” for KSU identifies undergraduate research as one of the three engaged learning experiences that students will have increased access to, we developed a guide so that faculty can easily identify the resource(s) that is most beneficial to their individual work. This guide is based around the Undergraduate Research Taxonomy developed at KSU. We used the attributes of this taxonomy to identify articles, websites, videos, and other documents that include information specifically related to each attribute. This will allow faculty to target the information that they need assistance with easily. Each resource also includes a short description, so that a faculty member can save time and choose the option best suited to their needs.

The information below was designed and formatted to be added to the QEP website linked above. The coordinator of the FLC will assist with any necessary formatting or changes to add the information to the website.

Faculty Resources on Undergraduate Research

Faculty should also utilize resources on the Office of Undergraduate Research webpage:

<https://research.kennesaw.edu/our/>.

General Resources:

- Engaging Undergraduates in Publishable Research: Best Practices
 - This resource includes 44 articles grouped into five categories: (1) structuring the curriculum to promote undergraduate research and publication, (2) optimizing research experiences for undergraduates, (3) training students in implementing advanced techniques, accessing special populations, or conducting research in off-campus settings, (4) addressing institutional and career challenges for faculty, and (5) increasing inclusion and diversity.

- <https://www.frontiersin.org/articles/10.3389/fpsyg.2019.01878/full>
- The Arts & Humanities division of the Council on Undergraduate Research has a resources page with links on many aspects of engaging in undergraduate research, both for students and faculty. This may be particularly helpful for faculty in the Arts & Humanities since it is specifically focused on aspects of undergraduate research in those disciplines. There are sections on topics such as “how students can communicate the value of their undergraduate research experience to employers”. There is also a helpful section for faculty on assessing undergraduate research in the Arts & Humanities with linked resources.
 - <http://curartsandhumanities.org/resources/>
- The National Council of Teachers of English developed a position statement on undergraduate research in writing and rhetoric disciplines. It provides suggestion and examples that can be utilized by faculty in these disciplines:
 - <https://cccc.ncte.org/cccc/resources/positions/undergraduate-research>
- TEDx talk: Preparing Students for the World through Undergraduate Research: Bethany Usher at TEDxGeorgeMasonU
 - <https://youtu.be/73nzMbMDOiw>

Resources Associated with KSU Undergraduate Research Taxonomy

The Office of Undergraduate Research (OUR) at KSU has developed a taxonomy that faculty can use to assess their own undergraduate research projects, and to document the “high-impact” that experience has. The taxonomy is linked here:

https://engagement.kennesaw.edu/docs/10_Undergraduate_Research_Taxonomy.pdf.

There are 8 dimensions on the taxonomy, listed below with resources for faculty members to utilize if more information and support is needed.

- **The course instructor is well qualified (knowledge, experience)**
 - Document both experience with undergraduate research (with assessment from students if possible), as well as experience teaching the content for the current project
 - CUR maintains an “Assessment Toolkit” for undergraduate research here
 - <https://www.cur.org/resources/faculty/assessment/toolkit/>
- **The teaching method(s) and course content should be aligned with student skill level**
 - This KSU resource outlines questions to consider as you plan a course that will include undergraduate research. In the “Planning the Course” Section, faculty are given specific questions to consider as they plan a course to ensure that the content will be aligned with students’ skill level and have appropriate expectations.
 - <https://research.kennesaw.edu/our/faculty/intergrating-research-projects-into-a-course.php>

- **Applied learning (application of current knowledge) is an essential component of research**
 - According to recent literature, professors often design undergraduate research courses with the goal of producing an end product without aligning the course objectives to the assessment of the entire undergraduate research experience. In the following study (Wilson, Howitt, and Higgins, 2015), they found that professors were able to articulate their desired learning objectives for their undergraduate research projects. However, the professors were unable to state how their assessment was related to these learning objectives. Rather, the assessment was primarily designed around the end product. As a result, the authors concluded that the learning objectives could not be considered to be reinforced and that the feedback on the learning process—and the end product—occurred too late (i.e., after the student had completed the project).
 - Wilson, Howitt, and Higgins. 2015. A Fundamental Misalignment: Intended Learning and Assessment Practices in Undergraduate Science Research Projects.
 - <https://www.tandfonline.com/doi/abs/10.1080/02602938.2015.1048505?journalCode=caeh20>
 - The authors suggested addressing these issues by incorporating more informal assessment into their undergraduate research projects to put more emphasis on the learning process. Accordingly, the authors' interviews suggested that the professors were confident in their ability to assess the progress of their students throughout the research process. However, the authors did not address the problem of students receiving feedback too late. One solution may be found by incorporating a series of short reflection assignments, such as those outlined by Ash and Clayton (2009, cited below).
 - Incorporating applied learning:
 - A common mistake in converting an existing course to include undergraduate research is to treat the undergraduate research project as an additional task, which compresses the coverage of important content. Instead, recent research suggests that professors should substitute existing assessments with undergraduate research projects that achieve the course's original objectives. That is, the students achieve the course goals through undergraduate research, instead of achieving the course goals then initiating undergraduate research. The three articles below focus on different aspects of incorporating applied learning into undergraduate research:
 - Copper, Soneral, and Brownell. 2017. Define Your Goals Before You Design a CURE: A Call to Use Backward Design in Planning Course-Based Undergraduate Research Experiences.
 - This article is theoretical and gives advice on considering overall objectives before designing the undergraduate research project.

- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5440170/>
 - Corwin, Graham, and Dolan. 2015. Modeling Course-Based Undergraduate Research Experiences: An Agenda for Future Research and Evaluation.
 - This article is oriented more toward the specific model one might use and is focused on the hard sciences.
 - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4353087/>
 - Becker. 2020. Research for All: Creating Opportunities for Undergraduate Research Experiences Across the Curriculum
 - This article is focused on the humanities and has ideas for implementation of applied learning.
 - https://www.researchgate.net/publication/338778908_Research_for_All_Creating_Opportunities_for_Undergraduate_Research_Experiences_Across_the_Curriculum
- **Ethics and safety in research are emphasized**
 - This KSU resource outlines IRB requirements for research with human subjects, animals, and exemptions for class projects. Researchers should review this information prior to planning an undergraduate research experience to ensure compliance.
 - <https://research.kennesaw.edu/our/faculty/ethics-and-undergraduate-research.php>
 - Although researchers give significant consideration to the ethical treatment of human subjects and animals, they may sometimes fail to consider the ethical treatment of research assistants. In a 2013 article, Neufel and Beike present a “Research Assistant’s Bill of Rights”, which includes articles such as the “right to proper training” and the “right to feedback.”
 - <https://files.eric.ed.gov/fulltext/EJ1043543.pdf>
- **Integration of critical and creative thinking is an essential component of research (interpret and evaluate information/data; solve problems; draw appropriate conclusions)**
 - A Critical Thinking Resource from Stanford
 - <https://plato.stanford.edu/entries/critical-thinking/>
 - The Foundation of Critical Thinking
 - <https://www.criticalthinking.org/>
 - Six recommended critical thinking skills and how to improve them
 - <https://www.rasmussen.edu/student-experience/college-life/critical-thinking-skills-to-master-now/>
 - Creative Thinking: This is a video about how an innovation lab in California created a new shopping cart. The video has been used by many business schools to teach creative thinking or innovation courses.
 - <https://youtu.be/W6EgoiPxNDs>

- No matter is for critical or creating thinking, how to find the research questions and target the research questions is an important skill. Starting from Qualitative Research vs Quantitative research.
 - <https://www.simplypsychology.org/qualitative-quantitative.html#Qualitative-Research>
- Jonathan Haber, 2020. It's Time to Get Serious About Teaching Critical Thinking
 - This article described enhanced communication from faculty to students, also about NOT using overly technical language. It also encourages readers to view thinking in a structured fashion.
 - <https://www.insidehighered.com/views/2020/03/02/teaching-students-think-critically-opinion>
- Dowd, et al., 2018. Understanding the Complex Relationship between Critical Thinking and Science Reasoning among Undergraduate Thesis Writers
 - From the article, this study "1) provides a bridge to prior work suggesting that engagement in science writing enhances critical thinking and 2) serves as a foundational step for subsequently determining whether instruction focused explicitly on developing critical-thinking skills (particularly inference) can actually improve students' scientific reasoning in their writing."
 - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6007780/>
- Holmes, Wieman, and Bonn, 2015. Teaching critical thinking
 - This article "demonstrated a structure for providing suitable practice that can be applied in any instructional setting that involves the acquisition of data and relating that data to scientific models." It also "reported the results of applying that structure in an introductory physics laboratory course."
 - <https://www.pnas.org/content/112/36/11199>
- **Development of oral and written communication skills are integrated into the course**
 - The suggested learning outcomes at this KSU webpage can be used to integrate written or oral communication into the learning outcomes of the course
 - <https://research.kennesaw.edu/our/faculty/learning-outcomes.php>
 - This KSU webpage includes links for popular outlets to disseminate undergraduate research, some written and some oral:
 - <https://research.kennesaw.edu/our/presenting-publishing/index.php>
 - This KSU webpage includes resources for supporting students in preparing for an academic conference:
 - <https://research.kennesaw.edu/our/faculty/academic-conferences.php>
 - The KSU Library awards one undergraduate research paper that utilized library sources the "Undergraduate Research Award" every year, and the winner is guaranteed publication in the *Kennesaw Journal of Undergraduate Research*.
 - <https://library.kennesaw.edu/ura.php>

- The University of Nebraska-Lincoln has compiled an extensive list of undergraduate research journals to assist in finding somewhere to publish the products of undergraduate research:
 - <https://unl.libguides.com/c.php?g=51642&p=333909>
- There is another list by CUR – go to cur.org and click on “Member Resources” and then Student Journals (you have to be logged in as yourself to see it).
 - <https://www.cur.org/resources/students/journals/catalog/>
- **Critical reflection is well integrated into student learning**
 - Ash & Clayton, (2009): Generating, Deepening, and Documenting Learning: the Power of Critical Reflection in Applied Learning (DEAL model)
 - This article presents a model that can be adapted to multiple kinds of high-impact practices in order to embed critical reflection into the project. The authors outline concrete steps for faculty to design their own reflection activities.
 - <https://cpb-us-w2.wpmucdn.com/blogs.umb.edu/dist/b/1275/files/2014/11/Ash-Clayton-Generating-Deepening-and-Documenting-Learning-PUBLISHED-1dja3xk.pdf>
 - University of Waterloo:
 - The Centre for Teaching Excellence created a resource page on designing critical reflection assignments. It is broader than the Ash & Clayton (2009) article, but links to that and several other models for designing critical reflection. This would be a useful starting place to review the major factors that need to be considered for critical reflection prior to designing the specific assignments. There are many useful resources linked here as well.
 - <https://uwaterloo.ca/centre-for-teaching-excellence/teaching-resources/teaching-tips/planning-courses-and-assignments/course-design/critical-reflection>
- **Assessment is used to monitor student learning and make course improvements**
 - This KSU resources outlines learning outcomes in several categories that can be incorporated into syllabi for undergraduate research. Categories include: Content-based outcomes; skill-based outcomes; disciplinary/professional socialization outcomes; and self-identity/improvement outcomes. Resources with more detailed information on these outcomes are also linked.
 - <https://research.kennesaw.edu/our/faculty/learning-outcomes.php>
 - Ashley Finley, with American Association of Colleges & Universities has developed a comprehensive guide for designing assessment of high-impact practices. This document provides a model that faculty can follow and apply to their own projects.
 - https://www.aacu.org/sites/default/files/files/publications/accu_niloa_hips_pub_2019.pdf

- The Society for the Teaching of Psychology created a taskforce focused on Best Practices in Undergraduate Research. They developed the Best Practices in Undergraduate Research Rubric (BPURR) that can be used to help design and assess all types of undergraduate research experiences in Psychology, although elements of it can be used in other related disciplines.
https://drive.google.com/file/d/1KNrJBXiBfuKP_fGtiDC0sA9-5EMrpqcN/view?usp=sharing

While mentoring is not officially on the taxonomy, it is essential for a high-quality undergraduate research project. The following section links to resources on effective mentoring:

- University of Kansas: Tips for Effective Mentoring
 - This website from the University of Kansas includes detailed suggestions in relation to 6 major tips for effective mentoring: 1) Establish clear expectations; 2) Make the steps of the research process explicit; 3) Teach students resilience; 4) Incorporate routine checks for understanding; 5) Foster increasing independence; 6) Address professional development. For each of these tips, there are concrete suggestions for action steps a mentor can take at the start of a project to establish a good foundation.
 - <https://ugresearch.ku.edu/mentor/tips-for-effective-mentoring>
- Elon University
 - The Center for Engaged Learning at Elon University has an extensive video series on excellence in mentoring undergraduate research. They invited experts from across multiple disciplines to discuss various aspects of mentoring. The videos are short (7-15 minutes in most cases), and each focuses on a specific topic so one could target videos on what is most helpful. Some of the topics include: Defining Undergraduate Research and Inquiry; High Quality Undergraduate Research Mentoring; Supporting Faculty Mentors Across Their Career States; Institutional Practices that Foster Undergraduate Research Mentoring; Scaling Access and Success; Significant Questions and Challenges; Undergraduate Research and Journals and Professional Organizations, and more.
 - <https://www.centerforengagedlearning.org/doing-engaged-learning/mentoring-undergraduate-research/>
- CUR strategies for effective mentoring:
 - This is a Focus article from CUR Quarterly that includes “Five Effective Strategies for Mentoring Undergraduates: Students’ Perspectives”. This article discusses how to be an effective mentor from a student perspective. Student researchers reflect on what has been most helpful to them.
 - <https://www.cur.org/assets/1/7/333Spring13Pita11-15.pdf>

- Society for the Teaching of Psychology (STP): How Mentors Make it Meaningful. This information is organized around 5 areas: outlining expectations, finding support, scaffolding the experience, considering ethics, and meeting frequently.
 - <http://teachpsych.org/ImprovingUndergraduateResearch>
- American Psychological Association (APA): Introduction to Mentoring: A Guide for Mentors and Mentees. Both of these resources were developed by the APA, but many suggestions are broadly applicable to many disciplines.
 - This is an introductory article discussing mentoring overall. It is not specific to undergraduate research, but faculty may find it useful to review basic principles of mentoring. It is marketed for graduate student mentoring, but many of the principles should hold true with undergraduates as well.
 - <https://www.apa.org/education/grad/mentoring>
 - This booklet discusses many aspects of mentoring, including ethical considerations; issues of equity; and how to find a mentor. It is also not specific to undergraduate research, but many of the suggestions are applicable.
 - <https://www.apa.org/members/content/booklet-mentoring.pdf>
- This special issue of Elon University's *Perspectives on Undergraduate Research & Mentoring* will be particularly helpful for faculty in the arts and humanities. Articles include:
 - Mentoring Undergraduate Research in Theater and Dance: Case Studies of the Salient Practices Framework in Action
 - Deconstructing Authority for Truly Collaborative Mentorship in Undergraduate Creative Writing
 - Divisional Trends in Undergraduate Research: A Data-Driven Dialogue in the Creative Arts
 - Finding the Words: An Epistolary Essay on Mentoring in the Creative Arts
 - <https://www.elon.edu/u/academics/undergraduate-research/purm/current-issue-purm-8-1/>

Conclusion

In conclusion, this FLC compiled and designed a resource webpage where faculty could access information related to all dimensions of undergraduate research as assessed by KSU. Our ultimate goal was to support the QEP by enabling more faculty members to engage in undergraduate research. Additionally, we developed resources that will assist faculty who are currently involved in undergraduate research to enhance those activities through evidence-based practices in HIPs.