Infusing Undergraduate Research in Natural Sciences/Health Sciences

I. Infusing Undergraduate Research in Natural Sciences/Health Sciences (Protocol for Systematic Review)

a. Talley, C. H., & Williams, K. P. (2018). Preparing future healthcare professionals for community engagement: A course-based research experience. *ABNF Journal, 29* (2), 33-41.

i. Research project: This CURE utilized community-based participatory research to assess community healthcare workers' perceptions of the transition from face-to-face Kin Keeper Cancer Prevention Model training to online training.

ii. Course format: This was a two-semester course designed for undergraduate sophomores to seniors with 16 students per course (1:8 instructor to student ratio).

iii. Student involvement: Students prepared five relevant questions for interviews, conducted one-on-one key informant phone interviews, contributed to data analysis with their assigned faculty member, examined peer-reviewed literature as related to the themes generated, and presented their findings at the annual University Undergraduate Research and Arts Forum.

b. Malotky, M. K., Mayes, K. M., Price, K. M., Smith, G., Mann, S. N., Guinyard, M. W., ... & Bernot, K. M. (2020). Fostering inclusion through an interinstitutional, community-engaged, course-based undergraduate research experience. *Journal of Microbiology & Biology Education, 21*(1), 11. https://doi.org/10.1128/jmbe.v21i1.1939

i. Research project: This CURE utilized community-based participatory research, and the research project was dependent on the needs of the community partners each semester.

ii. Course format: This was a one semester course with 25-32 undergraduate students per course.

iii. Student involvement: Students participated in data collection and analysis and developed unique research questions based on the available data.

c. Swanson, H. I., Sarge, O. K. P., Rodrigo-Peiris, T., Xiang, L., & Cassone, V. M. (2016). Development of a course-based undergraduate research experience to introduce drug-receptor concepts. *Journal of Medical Education and Curricular Development*, *3*, 57-66.

i. Research Project: This CURE utilized lab-based research to investigate drug-drug interactions in breast cancer.

ii. Course format: This was a one credit hour research experience (2-hour lab-based activity & 1 hour follow up discussion) with freshmen cohorts (7-11 students per section) led by two faculty instructors and one senior undergraduate instructional assistant per section.

iii. Student involvement: Students treated cultured yeast suspensions with a specific drug combination assigned by the instructor, prepared samples with the vehicle control, entered data on a spreadsheet in a shared Google drive, evaluated standard errors, and presented research posters at a university-wide symposium on undergraduate research

II. Research-Based Course Activities

a. Creating a Systematic Review Protocol: This activity can be completed in large lecture courses in any discipline. Students should be broken into groups of at least 3 but no more than 10 members.

i. Introduction to PICO question framework (exposure)

1. Students will be able to create a research question suitable for a systematic review.

ii. Introduction to literature searches (skill-building)

1. Students will be able to find any pre-existing systematic reviews on their research topic.

iii. One-on-one appointments to develop search strategy for one database (intensive)

1. Students will be able to develop a search strategy for one database.

iv. Introduction to study design types (exposure)

1. Students will be able to create inclusion/exclusion criteria for their systematic review protocol

v. Introduction to data extraction plans (skill building)

1. Students will be able to extract data from one study.

vi. Introduction to risk of bias tools (intensive)
    1. Students will be able to critically appraise one study using their selected risk of bias tool.
vii. One-on-one appointments to discuss data synthesis & dissemination (intensive)
    1. Students will be able to create a plan for data synthesis & dissemination.

III. **Assessing Undergraduate Research and Inquiry Activities**

a. Part 1 of Systematic Review Protocol (20% of course grade)
    i. Research question for systematic review
    ii. List of databases to search
    iii. Search strategy for one database
    iv. Inclusion/Exclusion criteria including types of study design
b. Part 2 of Systematic Review Protocol (20% of course grade)
    i. Data extraction plan
    ii. Selected risk of bias tool
    iii. Strategy for data synthesis and analysis of subgroups
    iv. Dissemination plan

IV. **Additional Resources**

a. Faculty Resources
    i. Consider collaborating with an FAU liaison librarian in your subject area for a session on information literacy, summarization of previous literature, and/or identification of a research question. The form to request an instructional session is https://libweb.fau.edu/eforms/request-a-library-instruction-session/
    ii. Research has shown the benefit of professor-librarian collaborations
        1. Junisbai, B., Lowe, M. S., & Tagge, N. (2016). A pragmatic and flexible approach to information literacy: findings from a three-year study of faculty-librarian collaboration. *The Journal of Academic Librarianship*, *42*(5), 604-611. https://doi.org/10.1016/j.acalib.2016.07.001
        2. Kenedy, R., & Monty, V. (2011). Faculty-librarian collaboration and the development of critical skills through dynamic purposeful learning. *Libri, 61*(2), 116-124. https://doi.org/10.1515/libr.2011.010

b. Student Resources
    ii. Journals that publish systematic review protocols:
        1. Campbell Systematic Reviews
        2. BioMed Central Systematic Reviews
    iii. Repositories that host systematic review protocols:
        1. PROSPERO
        2. Open Science Framework

V. **Contact Dr. Michelle Knight (kebam@health.fau.edu) for additional information about this course/discipline area.**