Defining Classroom Objectives and Measuring Outcomes [1]

David Klaus
Aerospace Engineering Sciences
University of Colorado Boulder

My project as a CU President's Teaching Scholar is to Develop, Validate and internationally Disseminate guidelines and best practices for establishing a standardized Bioastronautics curriculum in science and engineering academic programs, with plans and anticipated Outcomes outlined as follows. The overarching goal is to align industry-led 'desired attributes' for future employees with a corresponding set of 'learning objectives' aimed at incorporating human space flight into traditional science and engineering education.

DEVELOP

1. Document existing Human Space Flight (HSF) grad and undergrad education programs

    a. Create database of HSF topics currently offered, where taught, and who teaches them
    b. Correlate faculty research expertise with specific HSF course content applications

2. Establish a systematic academic framework for teaching HSF subject matter

    a. Identify comprehensive list of relevant HSF education topic areas
    b. Decompose topic areas into structured, detailed supporting subject matter
    c. Outline ~3-5 specific Learning Objectives for each subject
    d. Identify key scientific and engineering principles underlying each subject
    e. Organize Topics with corresponding Learning Objectives into course syllabi

VALIDATE

3. Align educational goals with stakeholders (academia, government, industry & humanity)

    a. Survey employers to prioritize HSF topics most beneficial for new hires to know
    b. Characterize cost/benefit potential for academia to incorporate HSF education
    c. Assess student incoming interest and outgoing retention rate in HSF
    d. Define pathways for applying space habitat systems analysis to improving life on Earth

4. Determine effectiveness of HSF education programs using outcome assessment metrics

    a. Quantify recruiting impact of HSF program on school selection
    b. Quantify quality of HSF education (including application to other careers)
    c. Quantify impact of HSF education on career choice, placement, performance, retention

DISSEMINATE

5. Disseminate curriculum guidelines to cultivate HSF education programs internationally

   a. Solicit inputs from colleagues regarding comprehensive outline and subject matter
   b. Coordinate an ‘advertising campaign’ to stimulate interest in HSF at other schools

6. Facilitate instruction of relevant HSF subject matter within engineering and sciences

   a. Organize conference sessions to serve as a forum for HSF education topics
   b. Create database of shared teaching ideas, lecture notes, photos, videos, exam questions

OUTCOMES

7. Publish and present outcomes in IJEE, ASEE and/or other relevant forums

8. Assess interest in and feasibility of forming a Society of Human Space Flight Educators

Groups audience:
President's Teaching Scholars Program

Links
[1] https://www.cu.edu/ptsp/defining-classroom-objectives-and-measuring-outcomes