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***Strategies for Incorporating Inclusive Pedagogy in STEM Courses***

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in collaboration with Ester Sihite, Ph.D. and other members of the Inclusive Pedagogy Team at The Center for New Designs in Learning &Scholarship (CNDLS) at Georgetown University.

**Goals of Workshop:**

* Participants will gain a deeper appreciation for the need for incorporating inclusive pedagogy in STEM teaching.
* Participants will practice strategies for introducing or increasing inclusive content in STEM courses.
* Participants will be activated to consider the incorporation of these strategies within their praxis.

**Why Inclusive Pedagogy in STEM courses?**

* There is a lack of diversity in STEM fields.
* Diversity in STEM is needed for a robust, trustworthy and enriched field.
* One of the factors is lack of diversity in undergraduate STEM majors.
* This is partly due to higher attrition (lower retention) of under-represented minority students in STEM majors.
* Efforts to change these trends must focus on:
	+ Equity of Access.
	+ Equity of Experience.

***Reflection:*** *Among all the moments of your STEM education, pick one in which you felt particularly engaged with the course, the material, and/or the instructor.*

**The GOAL of Inclusive Pedagogy is to increase equity of experience for every student.**

**What is Inclusive Pedagogy?**

*Inclusive learning and teaching in higher education refers to the ways in which pedagogy, content, assessment, climate, and power are designed to engage students in learning that is meaningful, relevant, and accessible to all.*

Adapted from: Hockings, C et al. (2010). *Inclusive learning and teaching in higher education: A synthesis of research*. York: Higher Education Academy.

Students are different, including with regard to forms of academic preparation with which they come.

***Equity*** means that all students accepted into the course or the program are provided a reasonable, attainable opportunity to achieve the learning goals of the course from where they began.

Each student should feel like they are ***integral, productive part of the learning community*** that is formed in the course, i.e., that they ***belong***.

**Assessment:** Ways in which students are expected to demonstrate the mastery of learning.

**Climate:** norms of interaction between students w. prof & one another. the learning environment.

**Power:** Dynamics of interaction between students and professors. *Power to vs power over*

**Pedagogy:** the methods and practice of teaching; the act of teaching; the *how*.

**Content**: the main lessons and material you have chosen that students should gain by the end of the course; the *what*

**Incorporating Inclusive Pedagogy Content into STEM classes.**

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| --- | --- | --- |
| **DISCIPLINE** | **TITLE & INSTRUCTOR** | **Inclusive Pedagogy Content** |
| **Biology** | Developmental Neurobiology Dr. Elena Silva | Examine the role of diversity in experiment design in Dev Neuro, and therefore the empirical and social impacts that follows. Consider disparities in scientific literacy and accessibility thereby discussing the importance of diversity in Science within the context of the topic.  |
| **Geoscience** | Environmental Geoscience Dr. Sarah Stewart Johnson | Contribute to project aimed at opening-up access to field studies of water-quality for those with physical disabilities by producing 360-degree, immersive videos. Engage in questions of who can participate in science.  |
| **Chemistry** | Molecular Gastronomy Dr. Jennifer Swift | Engaging non-majors in learning and applying chemical concepts in the art and chemistry of cooking and nutrition.  |
| **Physics** | Principles of Physics Dr. Patrick Johnson | Incorporating physical disability case studies and creative ways in to increase access into the study of different concepts in physics.  |
| **Biochemistry** | Biological Chemistry Dr. MC Chan | Using case studies of specific moments in biochemistry history, examine the importance of diversity in producing a robust field of biochemistry. Definitive examples of how a lack of diversity can lead to impoverishment and skewed science.  |
| **Human Science** | Physiological Adaptations Dr. Jason Tilan | Pre-Health students examined the role of social diversity in creating or exacerbating conditions that led to the physiological adaptations under study, thus expanding their definitions of ‘scientific explanations’ for phenomena. |
| **Mathematics & Statistics** | Introduction to Mathematical StatisticsDr. Nicole Meyer | Assessed and critiqued the myriad ways in which statistics are used to describe difference both between and within groups of people, using historical illustrations of the impact of statistics on justice and equity.  |

**How does changing STEM content increase equity of experience?**

* Expand what it means to study/ be involved in STEM.
* Promote a sense of belonging within the field.
	+ Help students see themselves in the field
	+ Help students engage passion and achieve career goals in this field (intrinsic motivators)
	+ Build off students prior knowledge and experiences (asset model)
	+ Demonstrate that there is space and need for students in STEM
* STEM as a tool for social justice; STEM as contested ground for social justice.

**Strategies and Notes**

**Strategy 1: Know/identify your students**.

* Consider for whom you are designing this course / set of learning experiences.
* Consider: How do you get to know your students? On an individual level? On a group-level?
* Beware the Deficit Model Trap.
	+ Work to adopt a growth model and an assets-based approach (e.g., Community Cultural Wealth [Yosso, 2005])
* Beware the Hidden Curriculum: the “unspoken or implicit values, behaviors, and norms that exist in the educational setting” (Alsubaie, 2015, p. 125)

**Think of an upcoming teaching opportunity/role...**

*How would you get this information?*

*Who are your students? What are their characteristics, prior knowledge, or other pieces of information that would help you teach inclusively?*

*How could you utilize this information?*

**Strategy 3: Own your agency as a designer, scholar, and educator.**

* Go beyond Bloom’s Taxonomy when creating learning goals.
	+ What do you think your students really should learn by the end of the semester?
	+ Reclaim the hidden curriculum
* Define your own agency and role in the community.
	+ You are an expert...don’t be afraid to share your enthusiasm with the students--and also invite them in to be teacher-learners (Freire, 1993)
* Model expertise (Arend, 2014)

*What expertise and expert behavior do you hope to model or for your students to learn? (What makes you uniquely qualified to teach this course/set of activities?)*

*What are the learning goals that are important to you and your course (beyond Bloom’s taxonomy)?*

**References and Resources**

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