Course-Based Undergraduate Research Experience in computational neuroscience as a tool to inclusivity in STEM Education

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STEM education is not inclusive

University DROP OUTS
- 26% of Black STEM students
- 20% of LatinX STEM students
- 13% white STEM students

Neuroscience data [in]accessibility

- fMRI data acquisition = between $300 and $1,000 an hour
- Data are usually used **only once**
- Most colleges do not have access to imaging facilities at all
- Data acquisition is limited to faculty and grad students

Cloud Computing
Online repository
Big Data analysis
Data Mining
Hypotheses testing

brainlife.io
Transforming undergraduate curricula to nurture inclusive excellence in STEM through *course-based research experiences* (CRE)

*increase capacity for inclusion of all students, especially those students who belong to groups underrepresented in science.*

No selection
no self-selection
no extra curricular time
Research ownership
CRE at LTU

- **Scale:** more than 40 courses and 30 instructors
- **Heterogeneity:** CRE involves all the academic fields within Arts & Sciences

Small PUI, 3500 students, 4 colleges, 15 departments, South-East Michigan

About 30 instructors from all disciplines within Art and Sciences
Principles and Logistics of CRE at LTU
Integrating CRE and BrainLife.io

- CRE courses at LTU
- CRE course at partner MSIs
- Instructor training and outreach
- Collaborative proposal-development activities.
Volumetry extraction from publicly available datasets through Freeesurfer

Hypotheses about age- and disease-related morphometric brain changes

- Introduction to anatomy and function
- Intuitive understanding
- Sense of ownership
- Team work
- Unlimited discovery playground

Datasets:
CUD: Garza-Villarreal et al., 2017, N=30
HC1: Wommen et al., 2022, N=10
HC2: Bakkour et al., 2019, N=10
R1s
- know how
- Cloud infrastructure

Open Data Science Education

PUIs
MSIs
International Network:
Open access

CRE community:
Pedagogical models
DEI
Thanks!

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