Collaborating between Writing and STEM: Teaching Disciplinary Genres, Researching Curricular Interventions, and Engaging Science Audiences

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Phase I: Need for Curricular Intervention
- Physics faculty observe that students lack writing skills, particularly with genres of writing in their field of study
- Writing taught sporadically in undergraduate curriculum
- Faculty training typically does not prepare to teach writing
- Curriculum must prepare students for variety of careers
- Report by Joint Task Force on Undergraduate Physics Programs
  - revise the curriculum with emphasis on communication

Curricular Collaboration: Physics and Writing Faculty
- Introduce concepts from Writing Studies to Physics faculty
- Demonstrate that students can be taught writing conventions of physics, and that faculty can do this teaching
- Collaborate on development and dissemination of physics-specific curricular materials
- Research how teaching physics genres enables students to conceptualize themselves as emerging scientists

Phase II: Physics and Writing Research
- Interdisciplinary study between Physics Department and University Writing Program, in parallel with curricular revision
- Research question: Does instruction in genre and understanding audience improve undergraduate writing in physics?
  - Identify key genres of physics writing
  - Collect student writing in these genres
  - Develop rubrics to code and evaluate writing
  - Perform quantitative and qualitative analysis
  - Longitudinal study: collect student writing from courses spanning the sophomore, junior, and senior year
  - Comparative study: collect student writing from before and after the introduction of explicit writing genre instruction

New Physics Learning Goals
- Familiarity with physics genres
- Proficiency in communicating ideas & research
- Capacity to communicate with various audiences
- Active participation in peer review
- Analysis & reporting on articles & proposals
- Applications for competitive opportunities & jobs

Curricular Interventions: Genres in Physics
(Written materials for research study in boldface)
- Abstract
  - Physics Today Article
  - Oral summary without slides
- Summary
  - Research Article
  - Oral summary with slides
- Abstract
  - Research Project
  - Presentation with slides
- Cover letter & Resume
  - Proposal
  - Presentation for outreach
- Abstract for research
  - Presentation on research ethics and issues of equity
- Lab research reports
- Final report on research
- Poster on lab project
- Symposium Presentation
- Poster at Research Days

Phase III: STEM and Writing Faculty Collaboration
- Expanding from Physics to STEM with monthly seminar series between STEM and Writing Faculty
- Share research from Writing Studies and STEM
- Exchange pedagogical interventions related to writing
- Develop in- and external community of research and practice

Professional Organizations and Funding Agencies
- American Physical Society funds for curriculum development
- University funding to create data and build research team
- National Science Foundation grant applications to further develop research study in physics

Future Writing and STEM Collaborations
- Further expand the community by disseminating findings to STEM faculty and Writing Studies scholars
- Continuation and broadening of student writing assessments throughout the STEM curriculum
- Future grant applications by Writing and STEM faculty together

Current Research Status
- Collected student writing from all relevant courses
- Developed rubrics and training packets for coders
- Evaluated and rated all abstracts, posters and graphs from 2017 to 2019
- Increased student engagement

Percentage of physics seniors presenting posters at Research Day (N=47)

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