Strengthening the Research-Teaching Nexus via Partnerships & Collaborations (a.k.a. Some Tips for New Profs)

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10 FEBRUARY 2022, SIMIODE EXPO 22
Submitted Abstract:

Will conducting research help me become a better mathematics professor? We investigate this question from the lens of a faculty in an undergraduate institution. Adapting a broadened view of mathematics research that includes creating undergraduate teaching resources that are interesting-to-the-21st-century student, not-in-your-usual-textbook, and classroom-tested-and-refined, the answer to the question is YES! Moreover, the nexus achieves a full circle when our students become involved in undergraduate mathematics research projects themselves, by further investigating and broadening our creations.
Sample teaching load Fall 2021:
- 4 units – Calculus 1 – 10 students
- 4 units – Developmental Math – 30 students
- 3 units – College Algebra – 30 students
- 3 units – Contemporary Mathematics – 35 students/online
## NSU Academic Portfolio Faculty Evaluation

### Teaching – 50%

1. Has syllabi which follow University Guidelines.
2. Creates assignments, projects, and/or exams related to the outcome(s) identified for the course.
3. Designs instructional activities clearly related to the outcome(s) identified for the course.
4. Identifies course materials, including textbook, which are clearly related to course outcome(s).
5. Employs instructional materials appropriate for the target student population.
6. Uses “up-to-date” course materials.
7. Prepares assignments, handouts, exams, and activities to promote student interest and enhance learning.

### Faculty Research – 25%

1. Publishes papers in journals and conference proceedings within teaching field or area of specialization.

### Undergraduate Research (included in 25% Faculty Research)

11. Supervises research projects.
3 Research-Teaching Nexus Models

Figure 1. Model by Healey (2005).
Figure 2. Model Wuetherick & Turner (2006)
Figure 3. Knowledge model of the research-teaching nexus

Visser-Wijnveen, G.J. (2015, December)
My Research-Teaching Nexus Experience

Award Abstract # 1822451
Collaborative Research: A National Consortium for Synergistic Undergraduate Mathematics via Multi-institutional Interdisciplinary Teaching Partnerships (SUMMIT-P)

SIMIODE Developer’s Workshop (DEMARC)

DEMARC -- Differential Equations Model and Resource Creators
TEACHER VERSION
Analyzing an Efficient Wireless Power Transmission System
Maiia Bruca-Hallare and Iordanka Panayotova
Department of Mathematics
Norfolk State University and Christopher Newport University

TEACHER VERSION
FITTING THE LOTKA-VOLTERRA MODEL TO TIME SERIES DATA
WITH gaussR PACKAGE
Iordanka N. Panayotova and Maiia Bruca-Hallare
Department of Mathematics
Christopher Newport University / Norfolk State University

TEACHER VERSION
The Good Kind of Virus: Modeling Oncolytic Virotherapy with Differential Equations
Iordanka N. Panayotova and Maiia Bruca-Hallare
Department of Mathematics
Christopher Newport University and Norfolk State University

TEACHER VERSION
The flush toilet: slow and late start
Maiia Bruca-Hallare and Charles Lamb
Department of Mathematics
Norfolk State University and Indiana University of Pennsylvania

TEACHER VERSION
Should Cancer Therapy Start Before or After Surgery?
Maiia Bruca-Hallare and Iordanka Panayotova
Department of Mathematics
Norfolk State University and Christopher Newport University

TEACHER VERSION
Time to Zero: Measuring Blood Ethanol in the Brain
My partners and collaborators...

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Proposed Model (based on my) Research-Teaching Nexus Experience

- Partnership with non-Mathematics expert to expand knowledge
- Creation and publication of classroom materials based on new knowledge
- Test and refine creations!
- Supervise undergraduate research projects that expand on created products!
Back to our question…

Will conducting research help me become a better mathematics professor?

1. Yes, because it raised my confidence-level as a professor-researcher.
2. Yes, because my students experience CONTEXTUALIZED LEARNING involving examples that are unique and interesting to them.
3. Yes, because I gained more confidence in using inquiry-based pedagogical methods.
4. Yes, because students APPROACHED me to direct their student projects.


Collaborators and Students

(On order of appearance in the slides)
Dr. Shahrooz Moosavizadeh, Mathematics, NSU
Dr. Makarand Deo, Engineering, NSU
Dr. Hongzhi Guo, Engineering, NSU
Dr. Kevin Santiago, Engineering, NSU
Dr. Iordanka Panayotova, CNU
Dr. Charles Lamb, IUP

Students:
Daniel Wright, CNU
Emily Adams, CNU
Nathan Kolling, CNU
Markevious Tolbert, NSU
Yasmeen Cox, NSU

Logan Lawson, CNU
Ajeya Dixon, NSU
John Herrmann, CNU
Bretia Green, NSU
Thank you!
Thank you, SIMIODE Expo 22.