Cline,K., J. Fasteen, A. Francis, E. Sullivan, and T. Wendt. 2020, A Vision for Projects Across the Mathematics Curriculum. *PRIMUS*. 20(4): 379-399.

Through the MAA Portal all MAA members have FREE access to PRIMUS so you should be able to easily find the work.

There is also a full (FREE) preprint version of the piece at

https://www.tandfonline.com/doi/full/10.1080/10511970.2019.1600176. Accessed 29 March 2023.

A Vision for Projects Across the Mathematics Curriculum - *PRIMUS* article

In the current issue of PRIMUS - see https://www.tandfonline.com/toc/upri20/current - there is a remarkable paper by five talented and accomplished faculty with the title "A Vision for Projects Across the Mathematics Curriculum."

When I began *PRIMUS* over 30 years ago this was **EXACTLY** the kind of article I had in mind: fully motivated approach, discussion of merits of teaching method, based on experience in the classroom, rich in detail, and filled with examples. I highly commend this piece to your reading and action!

We offer the Abstract and keywords:

Abstract: We consider the use of projects in math courses as a mechanism for promoting coding, communication, and interdisciplinary application of math skills. Final projects play an important role, but we also discuss several alternate types of projects. We describe a model that incorporates projects at all stages across the undergraduate mathematics curriculum. Finally, we provide samples of projects that we have used in selected courses.

Keywords: Projects, technical writing, coding, interdisciplinary skills, modeling

Here is the Introduction Section which explains the great features of the article:

“Current employers of math (and, more generally, STEM) majors give consistent advice to undergraduates: learn to code, learn to communicate effectively, learn an interdisciplinary skill, and learn to work intensively on a hard problem. Thus, one of our department’s goals is to create a mathematics major with plenty of opportunities to follow this advice. Indeed, students may have relatively little confidence in their ability to use their mathematical skill set in contexts outside of prescribed homework problems. We want to give our students opportunities to gain such confidence.

“In this article, we give a strategy for implementing class projects in math courses in order to help students develop communication and coding skills, practice working in groups, apply math strategies to various interdisciplinary contexts, and build mathematical habits of mind. The

advice given herein is relevant for a variety of class sizes, but actual implementation depends on the instructor's personal and institutional needs and demands.

"In Section 2 we discuss advantages of mathematical projects as a supplement to traditional homework and present a vision for a project-enhanced curriculum. In Section 3 we give some strategies for finding and creating effective math projects, as well as some examples that have worked well in our courses. In Section 4 we describe some options to consider when assigning a project to students, and in Section 5 we discuss some concerns about the effectiveness of projects, as well as some strategies to overcome potential difficulties."

The discourse, shared experiences, rationale for modeling, and examples are just what you need to move in the direction of using projects, almost all of which are mathematical modeling in intent in ANY course, but in particular in your differential equations course.

The authors offer much more details and present examples of projects they have used in mathematics courses in their department. A more detailed description of the following and other projects can be found at http://mathquest.carroll.edu/projects/

Finally, we offer here the set of References to give you even more incentive, evidence, and ideas:

Baehr, M. 1992. Center of mass of a can with a varying level of liquid. *The Physics Teacher*. 30: 34–36.

Cline, K. 2005. Numerical methods through open-ended projects. *PRIMUS*. 15: 274–288.

Consortium for Mathematics and its Applications. 2017. Problems and results from some recent years. https://www.comap.com/undergraduate/contests/mcm/previous-contests.php. Accessed March 2017.

Consortium for Mathematics and its Applications. Mathematical contest in modeling: Contest rules, registration instructions. http://www.comap.com/undergraduate/contests/mcm/instructions.php. Accessed 16 August 2018.

Dorff, M. 2014. Nonacademic careers, internships, and undergraduate research. *INVOLVE*. 7: 303–313.

Harwood, R. C. 2018. Logistics of mathematical modeling-focused projects. *PRIMUS*. 28(4): 360–385.

Meier, J. and T. Rishel. 1998. *Writing in the Teaching and Learning of Mathematics*. Washington, DC: Mathematical Association of America.

Sterrett, A. 1990. *Using Writing to Teach Mathematics*. Washington, DC: Mathematical Association of America.

Weld, K. 1996. Splines and roller coasters, a calculus project using Maple. *PRIMUS*. 6(2): 97–106.

Winkel, B. 1997. In plane view: An exercise in visualization. *International Journal of Mathematical Education in Science and Technology*. 28(4): 599–607.