

ASHLEY M. THARP

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In just five semesters at NCSSM, I have taught eight different courses, from Calculus Ia to Research in Mathematics. I redesigned the curriculum of the Combinatorics & Game Theory course to incorporate Inquiry-Based Learning and Specifications-Based Grading, and I am currently developing the curriculum of Advanced Combinatorics, which will be piloted as a forum in Spring 2026. I also taught a wide range of courses during my graduate career at NC State. There, I took on various teaching roles in calculus classes for Engineering and Science students and for non-STEM majors, a senior-level abstract algebra course geared towards Mathematics Education majors, and a pivotal required course for students majoring in Mathematics and Applied Mathematics. I also served as the Mathematics Department's first Graduate Support Resource TA, assisting a two-semester sequence of classes for first year graduate students which I helped develop. Below, I describe some of the strategies I use to support all of my students' success in my courses and beyond by helping them develop their knowledge, practices, and identity as mathematicians.

Supporting students in developing their mathematical knowledge is an obvious first objective for me as a math educator. Though my formal education and teaching experience before graduation provided me with a strong understanding of the content I have taught at NCSSM, they alone are not sufficient for my students to gain that knowledge. To support my students in learning as much math as possible, I complement my training with thoughtfully designed class materials and well-aligned external resources. In my first year on the Calculus I/II course team, I collaborated with colleagues to incorporate an accessible online textbook into homework assignments. During the following summer, I learned to navigate github and use PreTeXt to customize the textbook so that it better aligned with our course timeline. Throughout my time at NCSSM, I have used the stellar resources shared by colleagues, modified worksheets and Desmos activities to meet the needs of my students, and created original class materials to support rich in-class exploration.

In assessments, I hold students to high standards of demonstrating knowledge; in activities surrounding assessments, I incentivize them to participate in the best practices of mathematicians and high-achievers across disciplines. One practice that will serve students well in any career is experiencing small failures early and facing their failure head-on in order to grow. In Combinatorics & Game Theory, I assess knowledge in many formats, including Definition/Skill Check questions on which students must demonstrate completely accurate understanding of foundational concepts. These questions are graded Pass or Revise, with no partial credit, and two attempts at each question type are included in the structure of the course. To earn credit after their second attempt on a question, students must engage in vulnerable but high-impact practices: seeking support and directly addressing mistakes. Students must come to my office hours to review the misconceptions or inaccuracies in their first two attempts. In these discussions, I often prompt students to read over definitions and examples from the textbook or their notebook, and once the student and I feel relatively confident that they will not make the same mistakes again, they attempt a new version of the problems we have gone over together. While it is not unheard of for students to require still

more attempts at a minority of problems as they make more nuanced mistakes, this approach gives students a sense of agency in their own learning and progress in their understanding.

Another impactful habit that will serve students well throughout their lives is reflection, and all students benefit from understanding the connection between the input of their actions in class and the output of their test grades. I prompt students in every calculus class to consider this relationship using post-test reflections. Students consider whether they have done some “obvious” practices beneficial to learning (like taking high-quality notes and going to office hours) and share anything they have done above and beyond. In another section, students identify a few specific, measurable, and actionable things they want to *keep*, *stop*, and *start* doing to be successful in our class moving forward. Students who have math anxiety benefit greatly from this exercise: one such student, in an overview of calculus for non-STEM majors at NCSU, wanted to stop second-guessing their work and start practicing more. Finally, students give me feedback on how we spend class time and have an opening to make requests from me. Though this feedback has not constituted a mandate for drastic change to date, it is an invaluable opportunity for me to reflect on my teaching and has made courses feel co-created, increasing participation through the semester.

While I do not expect or hope that most students who come through my classroom will become math majors, it is important to me that all of my students experience themselves as mathematicians in their own right. A light-hearted approach I use to bring students into the community of mathematicians is having them use exclusively Hagoromo chalk in class after showing them a Youtube video featuring research mathematicians discussing their fandom of the chalk. In addition to creating more aesthetically pleasing boardwork, students enjoy having insider knowledge of the “Rolls Royce of chalk.” I also take student identification in mathematics seriously; in order to have a chance at self-identifying as a mathematician, each student must feel they belong in our classroom. I make class values explicit in the first week of class by sharing a set of axioms put forward by combinatorialist Federico Ardila, the last of which is that “every student deserves to be treated with dignity and respect.” The axioms are foundational as we set class norms and have been guideposts to reference throughout the semester. I have been proud to see diverse students take on the axioms to step up in many ways the classroom: those with already strong math backgrounds have accepted the challenge of creating space for all students to feel successful and becoming true thought partners, and those with less comfort in previous math spaces have grown to take up the space to ask questions and share their perspectives. It has been humbling to see students newly experience themselves as mathematicians, mathematics researchers, and mathematics educators even in the context of their own high school math classrooms.

I am committed to my ongoing growth as an educator, and I’m grateful to have learned with and from other math educators on- and off-campus. As a Project NExT Fellow in the Orange ’25 cohort, I have already been blown away by both the quantity and quality of the resources and pedagogical strategies that my early-career peers and more senior math educators leverage in their classes. Since returning from MathFest 2025, I have adopted gallery walks, question formulation tasks (QFTs), and other new pedagogical approaches to both calculus and combinatorics. I was chosen by Project NExT leadership to co-coordinate the cohort’s six workshops at the upcoming Joint Mathematics Meetings on topics from centering joy to mentoring undergraduates, and I look forward to bringing the lessons from the workshops and other JMM programming into my future classrooms.