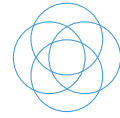


# Edge

CAROLINA EDUCATION REVIEW

VOL. 6



## RETHINKING THE AUTISM RESEARCH AGENDA

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The UNC School of Education is a community of collaborative researchers, practitioners, students, staff, and engaged alumni. We are dedicated to realizing the transformative power of education and to achieving equity in educational access and outcomes for all learners in a diverse and just society. Our work is guided by four pillars:



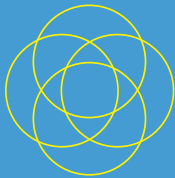
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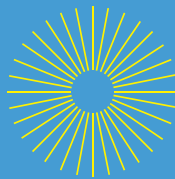
## **Empowering the Leaders of Tomorrow**

We empower educators and scholars to lead; to think creatively, act with passion, and strive for excellence and equity for all. Equipped to succeed in their professions, our graduates also emerge as leaders in their institutions and communities, and mindfully contribute toward continually improving and transforming them.



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We produce cutting-edge knowledge, and pursue innovative, research-based solutions to the most pressing problems of educational theory, practice, programs, and policy in North Carolina, the nation, and beyond.

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# From the Dean



## Greetings:

As you read this latest issue of *Edge: Carolina Education Review*, you will note that faculty members at the UNC School of Education work to bring innovative solutions — grounded in the best evidence — to education's most immediate and persistent challenges.

Education happens lifelong and lifewide. The factors that affect teaching and learning happen well beyond classrooms. Our research reflects these truths. Our scholars never lose sight of why their work matters — to benefit learners and educators, schools and districts, communities within schools and within which schools exist. What you read within represents just a sampling of high-impact work happening right now in Chapel Hill. We could fill many more issues of this publication.

You will hear from **Dionne Cross Francis, Ph.D.**, Joseph Neikirk Professor and a leading mathematics education scholar, about a recent Fulbright experience in Ghana. Her perspectives remind us that education happens in many contexts and that we are bound to share knowledge for the benefit of a global society.

**Ethan Hutt, Ph.D.**, the Gary Stuck Faculty Scholar in Education, recently published a book focused on assessment — a ubiquitous concept in education — and how we can begin to reimagine grades, transcripts,

and more. He talks about that work in a Q&A.

**Jill Hamm, Ph.D.**, William C. Friday Distinguished Professor of Education, is on the cusp of launching a simulation that will provide middle schoolers with invaluable collaboration skills inside mathematics and science classrooms. The NSF-funded project takes a unique storytelling approach and brings together several avenues of research from across Hamm's career.

You will also read about **Nianbo Dong, Ph.D.**, Kinnard White Faculty Scholar in Education, whose educational research tools and applied methodology work hold immense potential for our fields. If you have used PowerUp! to calculate a sample size for a power analysis, you are certainly familiar with his work.

Carolina is home to renowned researchers focused on special education and autism. Recently, **Brian Boyd, Ph.D.**, William C. Friday Distinguished Professor of Education and interim director of the Frank Porter Graham Child Development Institute, pivoted research to better serve underrepresented children and families, and launched a network of Black autism researchers that is poised to move research in necessary directions. **Harriet Able, Ph.D.**, has spent 40+ years serving children with special needs. Here we feature her work to secure critical training grants to equip early childhood and exceptional children educators and leaders with evidenced-based, family-focused practices.

These colleagues are part of a community advancing education in lasting ways — with students, families, and communities at the heart of their work. Happy reading.

## Foad Abd-El-Khalick

Dean and Alumni Distinguished Professor  
UNC School of Education

# ‘I must go there’

By Dionne Cross Francis

*In 2019, Dionne Cross Francis, Ph.D., Joseph R. Neikirk Professor, traveled to Ghana for two weeks to meet with mathematics teachers tasked with rolling out a new curriculum. She returned as a Fulbright Scholar from 2021-22. Here, she reflects on why she went, how it improves her work with U.S. teachers, and the benefits of a national curriculum.*

I have worked with mathematics teachers in the U.S. for a really long time, nearly 15 years now, trying to understand them as individual professionals.

What does it mean to require a teacher to change how they think about math? How do they think about themselves as mathematicians? How do they think about themselves as math teachers? What identity do you take on when you enter the classroom?

I also think a lot about what it means for math teachers to empower students as problem-solvers and thinkers. It's not just teaching their students more math. The research I have done shows that, to achieve this, there has to be an affective and psychological shift in how teachers enter the mathematics space.

That's an individual journey. There are commonalities across teachers, but they are individual people, independent thinkers who come to believe what they believe through different experiences.

From my work with U.S. teachers, I learned a lot about the American cultural context and how it shapes teachers' views of themselves as teachers, and how we

can help to support them in transforming their practices. I spent a lot of time with teachers — in classrooms — learning about how they make instructional decisions and what influences those decisions.

In 2019, I was concluding work directing a research center at Indiana University. That role focused on advancing the research of other faculty, supporting colleagues in securing funding while trying to move the mission of the center forward. There were many aspects that were fulfilling work as we were able to collaborate with a range of school communities to build partnerships that improved student outcomes.

But, I wasn't really focusing on the ideas I was interested in exploring. I needed to reconnect with data and the vision I had for my research.

I needed new and different opportunities to expand how I was thinking as a person and as a researcher. In addition to the U.S., I had previously worked with teachers in several other countries and had observed the role culture and context had in what mathematics learning looked like in classrooms, how teachers positioned themselves in relation to math and math teaching, and consequences for student learning



and engagement. I wanted to better understand the dynamic interaction among the teacher, students, and content and how this unfolded across different contexts.

While the majority of my research focuses on math teachers in the U.S., my work has always considered how we can support communities of color and not just ones in North America. I'm Jamaican, and even though I'm a naturalized U.S. citizen, I still consider myself an immigrant in many ways. I have always wanted to do work that supports developing countries, especially countries and communities of color that have been exploited in some way.

I return to Jamaica often to support teachers to instruct in student-centered ways. An ongoing partnership with the Reggae Math Foundation enables me to provide professional development for a couple of weeks every year.

This burgeoning interest to deepen my understanding of teacher mathematical development across contexts dovetailed with a colleague's interest to expand the international locations available for pre-service teachers

**The Edge:** Dionne Cross Francis is a leading scholar whose work lies at the intersection of mathematics education, educational psychology, and teacher education. She seeks to understand the contextual and teacher-specific factors that motivate teacher actions as they plan and instruct with the goal of determining the optimal design features of professional development that allow teachers to thrive.

to complete their student teaching. Her program had an exhaustive list of European countries but none in Africa. I narrowed options by exploring English-speaking countries not in current conflict and where there was something interesting going on educationally.

Ghana was rolling out a national mathematics

education curriculum that aligned with principles we know from research that support student learning and helps them to develop as competent problem-solvers.

The preamble of that curriculum contextualized the need for change and really centered on citizenry, nation-building, and equity. That's phenomenal. When do you pick up any curriculum document and see it grounded in nationalism, community advancement, and the nurturing of and care for each other? This was how they contextualized a mathematics curriculum — not an education system. I remember reading through that document and being blown away.

And I remember thinking to myself, "I must go there."

For those of us working in U.S., where states set curricula, seeing a brand-new curriculum up close and in its earliest stages is an intriguing opportunity as a researcher. Coming from Jamaica, which has a national curriculum, I know of the benefits and drawbacks of a single curriculum.

The prior Ghanaian curriculum was very teacher-centered, positioning the teacher as the one with all the knowledge, standing at the board, telling students what they need to do and know. They regurgitate ideas. Their approach to instruction, organization of content, and textbooks were outdated. From research, we know that, while students might pass exams, they often struggle to develop strong problem-solving skills. The new curriculum takes a student-centered approach and moves away from the traditional.

I was curious. How might Ghanaian teachers take up these new ideas, and what might that look like? One specific area of interest to me: What does it mean for Ghanaian teachers to teach in student-centered ways?

To me, teaching in student-centered ways means that you, as a teacher, have to value students' voices and ideas equitably, and that those voices and ideas can and should challenge you. You have to put ideas out there for your students to grapple with to really create a classroom context that advances their thinking. The viability and the validity of your ideas and those of your students is what pushes learning forward.

That approach can be difficult for a teacher anywhere. In the Ghanaian context, I would have expected that to be the case where age is highly respected by young people and teachers embrace the identity as an authority figure. How would those teachers work to dismantle that structure?

I went to Ghana for two weeks, trying to understand the teachers' experiences with rolling out this new curriculum. I visited nine schools — five private and four public. I observed K-6 classrooms and spoke to teachers one-on-one.

Some of the teachers still wanted to be positioned as the authority. There were two I distinctly remember who just never let go of that traditional way. I have seen many math classrooms, and this was unsurprising.

However, for the majority of teachers I spent time with, the exact opposite was true. Those teachers tried new things. They were open to different kinds of activities. They were open to allowing students to talk more. They were open to sharing ownership of their classroom with students.

One veteran teacher I worked with was skeptical, but open to change and to me helping him teach in student-center ways, providing students space to have more agency in their learning and crafting ideas. He did so on one condition; he wanted to test the approach. He would teach two classes,



**Dionne Cross Francis**

Joseph R. Neikirk Professor

each with a different approach. In one section, he lectured. In another, he provided his students with engaging activities and opportunities to work together and learn from each other. In the latter class during one lesson, students were so engaged they wanted to work through the bell for lunch. He told me that had never happened in all his years of teaching. The students in his traditional section caught wind of this format and demanded the same.

That's the kind of math classroom I envision for any cultural context. It was inspiring to see. More inspiring is why many of those teachers were excited about this curriculum. It was the first time I had interacted with teachers who were so excited about change, and their excitement was grounded in the thought that this was best for their children and it would advance the nation. Teachers I spoke with expressed a similar idea — this curriculum would move Ghana forward as a nation by developing Ghanaian children as thinkers; this curriculum would ultimately be good for society. They saw this curriculum as reinforcement of why they became teachers. High test scores were never mentioned. There was an



authenticity in their responses. Their expressions were not rehearsed.

I was able to observe classrooms in Accra, the capital, and then travel to a more rural community, Aburi, to experience different contexts. It was fascinating that the lessons were only two days apart. Of the schools I visited, four of the classes were all on the same topic. They literally were within days of the same lesson. To experience that was amazing. I thought, "No one's ever going believe me."

The value of this was profound. A child could move from one region to of Ghana to another and only miss a couple of days of school. In the U.S., moving from one school district to the next, you could lose three months.

Think of what that might mean for an individual or a family in the U.S. or anywhere who cannot remain

in the same space all the time for a range of reasons. Consider a low-income family who has to go where work is and doesn't have the resources to fill the gaps in knowledge. Having a national curriculum would be an academic game changer for transient families.

This standardization can also help teachers. Teachers across Ghana could support and help each other because what they were teaching from day to day was so similar based on the curriculum. In the U.S., we're so connected through social media. If we were all generally on the same page, teachers could support other teachers in that space. There are possibly hundreds of teachers who have taught these lessons before, including teachers in their own district, that they could learn from. But imagine the space for even

more productive communication, imagine where mathematics education could go.

That time in Ghana foregrounded how in some ways we tend to look at developing countries as always needing input, resources, ideas from developed, more advanced countries.

There was such vast richness there and so much to learn from their teachers and their education system more broadly.

That was 2019. I came back to the U.S. and thought to myself, "I must go back."

*Cross Francis returned to Ghana as a Fulbright Scholar from August 2021 to June 2022 — helping teachers grow their practice and maximize the outcomes of the new math curriculum. Many of the teachers she worked with there still communicate with her on WhatsApp.* 📱





# Rethinking the autism research agenda

*As a leading autism researcher, Brian Boyd refocused his own work and used his position in the field to better serve autistic people with intersecting, marginalized identities.*

For more than 20 years, Brian Boyd, Ph.D., has dedicated his career to ensuring a high-quality education and outcomes for a most vulnerable population — children and young adults with significant disabilities, who are often subject to exclusion, isolation, and poor postsecondary outcomes.

His research has led to effective classroom and home-based interventions for young children with autism. For autistic people who exhibit repetitive, restrictive, and sensory behaviors that interfere with their quality of life, his work helps them to more fully engage in learning experiences.

Boyd's more recent scholarship aims to engage and serve an even more vulnerable and marginalized population — autistic children and youth of color and their families. His goal is to make bold inroads to change diagnostic, service provision, and research processes to reduce systemic barriers in the



**Brian Boyd**

William C. Friday Distinguished Professor of Education

field of special education.

Boyd, William C. Friday Distinguished Professor of Education at the UNC School of Education, possesses an incredibly unique scholarly expertise and scholarly agenda that holds

**The Edge:** After two decades at the forefront of autism research and in 2020 during renewed awareness of racial inequality in America, Brian Boyd took a reflective look at the field. Now, he is at another forefront: leading efforts to diversify autism research, both participants and scholars, to better serve all autistic children.

the potential to alter the field of autism research. Through necessary diversity, equity, and inclusion efforts and research that engages community members as key stakeholders, his impact on the field can ultimately improve outcomes for all autistic children and youth.

## A field-leading autism researcher

Before Carolina, Boyd served as a professor of applied behavioral science at the University of Kansas, where he also led the Juniper Gardens Children's Project, a premier research institute known for ground-breaking efforts to improve the care and educational experiences of children over the last half-century.

Prior, Boyd spent nearly a decade as a faculty member in the UNC Department of Allied Health Sciences, earning tenure and holding research appointments at the Frank Porter Graham Child Development Institute and the Carolina Institute for Developmental Disabilities.

His work has resulted in more than 85 refereed journal articles in top journals across disciplinary fields, including *The Lancet*, *Journal of Child and Adolescent Psychiatry*, *Autism*, and *Journal of Early Intervention*. He has published seven book chapters and one book, "Handbook of Early Childhood Special Education."

Boyd serves as PI or Co-PI on four grants — totaling over \$20 million — from the National Institutes of Health, Health Resources and Services Administration, and the Institute of Educational Sciences. Previously, 15 of his funded research and development grants garnered approximately \$30 million, most from federal agencies, including NIH and IES. These grants enabled Boyd to run large-scale, randomized control trials of interventions in school districts across North Carolina, Florida, California, and Kansas.

### Driven by curiosity

Boyd's entry into the field of autism research was, perhaps like most researchers, driven by curiosity. Boyd's entry was also, to some



There are many underrepresented groups who haven't been featured in autism research, which raises the question: Well, what do we really know about autism?



degree, by chance. As a student in a psychology course at the College of William & Mary in the late 1990s, his textbook dedicated just a single paragraph to autism.

"We didn't talk about autism the way we do now," Boyd said. "There was something about that paragraph ... I searched online, and what popped up was the Autism Society of North Carolina's summer camp, Camp Royall."

Boyd served as a camp counselor during Camp Royall's very first summer, spending 10 weeks working with autistic people of varying ages and abilities levels.

"After that experience, I knew what I was going to do for the rest of my life," he said.

"People with autism are all so different," he said. "You may go all the way from people who have a co-occurring intellectual disability — so someone with a very low IQ and perhaps are not speaking — to people who have genius-level IQ and are quite verbal, quite social. It makes research challenging. Everyone is so different, and, yet, they're all under this label of autism spectrum disorder."

That summer experience led to a pre-doctoral internship at UNC-Chapel Hill's TEACCH Autism Program — which provides core services and unique demonstration programs that meet the needs of autistic individuals, their families, and professionals across North Carolina — where Boyd worked with 2-year-olds. At the time, very few 2-year-olds were being diagnosed with autism, he noted.

"Those early experiences led me to where I am and still drive my work today," he said. "I am still trying to answer some of the research questions that I have from those earliest encounters."

— — —

*Following is a Q&A with Boyd, who talked about where autism research needs to go, where his work is going, and how we can better serve autistic people who have intersectional identities.*

**You recently served as director at Juniper Gardens Children's Project, and you also serve in varying capacities for several field-leading journals. You have a unique opportunity to guide research. Where does**

### research focused on autism, developmental disability, and special education need to go?

There are a few areas. I was recently part of an international working group commissioned by *The Lancet* that produced a report about the future of autism research.

One area that we recognized in *The Lancet*, and this is something I had already recognized in my own research, is that there are many underrepresented groups who haven't been featured in autism research, which raises the question: Well, what do we really know about autism? People of marginalized groups haven't been involved in our research so what do we know about autistic people of color? Or about autistic people who might speak a different language? Or about autistic people who live in low- and middle-income countries around the world?

We have to make sure our research is reflective of the autistic population. They're not just autistic. They have multiple identities. They may be autistic and LGBTQ; I've been doing some of that research. We need to really think about those marginalized groups who haven't been featured in research — to grow our body of research and to ensure we understand as many perspectives as possible and to ensure the interventions we develop are culturally appropriate and relevant. Even the biological research being done, does it make sense in light of marginalized people not being featured in previous studies?

There is a big push to make sure the under-researched are included going forward.

Another area for study is around autism and aging. Autistic people age and grow old, but we don't know a lot about the aging process of autistic individuals and what it means to grow older with autism or disability. Does it mean you're at any

increased risks for physical or mental health conditions? Is there an earlier mortality associated with it?

[UNC School of Education faculty member] Kara Hume and I are working together on another area that deserves more attention: autistic adolescents who are at increased risk for co-occurring mental health conditions, particularly anxiety and depression. We need to begin to understand what they are going through and how we can mitigate those co-occurring mental health conditions.

And then another area involves fundamental questions around interventions. How do we best individualize interventions? For whom do our interventions work best? Under what conditions do our interventions work best? What's the best developmental window or timing for an intervention? Figuring out the developmental timing of our interventions and which work best for which individuals is something we're still figuring out because this has important implications for our work.

Those are some of the areas where the field is trying to move and where we need to go if we want to advance the lives of autistic people.

### More recently, your research has shifted to focus on the intersection of marginalized populations, most notably race and disability. What led to that shift? And what do you find at that intersection?

What led to that shift was my interactions with autistic families of color, in particular Black families, and the stories I was hearing from them.

They really have no ability to separate their race from their child's disability, and their child has no ability to separate their race and disability. They are operating at that intersection.

I was hearing concerns from families about their child having police interactions. They were saying, "He can't communicate or he engages in odd behavior, and

he's a Black male so what does that mean for his life? How do we navigate that as a Black family of an autistic child?" And I realized no one was talking about those things on the same scale we were talking about other issues in autism. But these issues impact the daily lives and experiences of autistic people of color.

And again, Black people with autism and their families are certainly underrepresented in research. We also see disparities in terms of timing of diagnosis. Black kids often get misdiagnosed earlier on so it takes sometimes longer to get an autism diagnosis, and we certainly see disparities in access to the kinds of services and quality of services for Black kids.

I really started to think, "I have a position. I'm at a place in my career and in the field where I can begin to speak to some of those issues," so I decided to shift a lot of my research to focus specifically on Black families and Black autistic children.

For me, what I found at that intersection is joy. It's the happiest I have been with autism research because it really marries my identity as a Black man with the research I do. I'm passionate about this. It's where I see my career going.

It's important to me to help those families have a voice, to amplify their voice. I've been talking to a number of Black caregivers, Black parents of autistic children, Black autistic people about their experiences and really trying to think about how we can shape a research agenda.

I also recently formed a group of Black academics in autism research, and we're going to have meetings where we talk about how we advance the cause. How do we uplift the Black experience within this field that is predominantly White researchers? We have to give space and voice to those who have been historically voiceless. It's

essential that we start to privilege the voices and experiences of [Black researchers] who haven't had a voice in this work.

**How do we begin to overcome these kinds of disparities for people of color and for people from underrepresented groups who have autism or some form of disability?**

I think part of overcoming these disparities is beginning to work in partnership with underrepresented communities, to really elevate the issues they are dealing with. We can't address these disparities without understanding the experiences of all marginalized identities of autistic people. One example: Autistic people who also identify as LGBTQ report poorer physical and mental health outcomes. We could infer that this is because these people live at the intersection of having a disability and being part of two marginalized groups in society. We need to really understand those intersections to help these groups overcome.

A number of people in our field are moving into participatory research methods, where you're partnering with stakeholder groups, whether they be autistic individuals or parents of autistic individuals or caregivers of autistic individuals. Those stakeholders or partners almost co-produce research — helping develop the research questions, think about the research methods, and then disseminate those findings back into the community.

That kind of research takes time because participatory research is about building trust and partnerships, and that's not easy work. We are already coming from a different space. Even though I'm Black, I'm not Black and autistic,

and I don't have an autistic child. I'm coming from a different space when I talk to a Black parent of an autistic child. I don't have that same experience. I have to recognize that I'm coming from a different space and from the lens of a researcher at a research-intensive university like UNC-Chapel Hill.

Those families have to see me as someone who's trustworthy and who's going to pursue research that will be of help to them and reflective of what's happening in their lives.

We also have to remember that non-researchers may not always see the value of research because, sometimes, the benefits or the yield from research can take a long time, and they need meaningful, impactful change right now. Understanding that I may not have an answer for them until five or maybe 10 years is a hard thing to understand sometimes. As researchers, to address the disparities, we need to think about how we can do more incremental research that may be more impactful more immediately as we continue our longer-term research agenda.

Another big reality: Overcoming these disparities is going to take funding because these are larger societal and systemic issues.

**You give talks to behavioral health care providers about implicit bias and structural racism. What's the response from the participants of those trainings? Are their eyes opened to new ways of thinking?**


I get a biased audience for a number of these talks. It's usually people who, in general, believe that issues of structural racism and racial biases exist in society. A lot of what I have heard is, "What

has taken us so long to talk about these issues within autism?"

I have also heard, "Oh, I hadn't thought about that, but now I can better understand the experiences I've had with some of the autistic families of color I've worked with," and "Maybe I need to rethink some things as a clinician and think about what they're dealing with."

They realize they need to remind themselves, as clinicians, that their patients aren't divorced from their identity as a person of color in society. It brings back Brofenbrenner's ecological systems theory. Children are nested in families, and sometimes clinicians get so focused on the child they forget that child is nested within a larger family, and the family could be dealing with issues of living in poverty, being a single parent, being a person of color in society. These challenges can't be divorced from the experiences of their child.

Some participants in these talks really begin to think about how these issues around race and racism are also impacting the outcomes and experiences of autistic children of color. And from the lens of the provider, they begin to think about their own implicit biases or their own naivete about these issues and the decisions they make for marginalized families.

In general, the response at these talks has been great, and I'm hoping that more people will take up the mantle of doing research around some of these issues to really understand how they're impacting outcomes. And I hope they continue to help change perspectives, helping attendees rethink and re-frame how they interact with some of their clients. 



## Creating new momentum in autism research

On Friday, June 9, Brian Boyd, Ph.D., William C. Friday Distinguished Professor of Education in the UNC School of Education and interim director of the UNC Frank Porter Graham Child Development Institute, hosted the first in-person meeting of the Black Empowerment in Autism Network, which met in Peabody Hall on the University of North Carolina at Chapel Hill campus.

The first-of-its-kind group of Black scholars was developed to make autism research more inclusive and examine the ways that autism impacts Black children and their families. The network aims to provide opportunities for Black autism researchers and experts to connect, share their experiences and knowledge, and discuss ways to improve understanding and support for Black autistic individuals.

“We want to represent the broad range of research that we see in autism and mentor the next generation of researchers,” said Boyd, whose research, over more than 20 years, has led to effective classroom and home-based

interventions for very young autistic children. “We want the group to represent a continuum of autism research with the goal of thinking about different audiences and ways to convey who we are, what we do, and what we want to accomplish.”

According to the National Center for Education Statistics, Black researchers make up approximately 7% of full-time faculty members at postsecondary institutions. Of those 7%, Black faculty research specializations are varied. As a field historically led by White scholars, autism research has had a scarcity of Black researchers and collected data that appropriately represents Black autistic populations — and the network is working toward increasing support and representation for both groups.

During the meeting, more than 20 researchers, educators, medical professionals, psychologists, speech pathologists, and social workers convened to discuss strategies to bridge the gaps in autism research and ways to enhance communication tactics between

practitioners and clients, which could result in more equitable and effective outcomes for Black autistic populations. In-person attendees work at institutions and organizations across the U.S., including North Carolina Central University, University of Wisconsin-Milwaukee, Penn State University, and more. Additional researchers from across the U.S. and one from Australia also joined the meeting via Zoom.

The day began with a presentation, “The State of Autism Research for Black Folks,” led by several attendees that explored a number of facets related to autism research, including the prevalence of autism in Black populations and the shortcomings of related data, diagnosis and its timing for Black children, access to services and outcomes of those services, diversity of autism researchers and research participants, and more.

After discussions and writing exercises, the day concluded with reflections on the proceedings and next steps for the Black Empowerment in Autism Network.



# Powering up educational research

*In Nianbo Dong's pursuit of applied quantitative methods and tools, he seeks out the toughest challenges faced by scholars and provides new, rigorous ways to ensure high-impact research that benefits the most marginalized students.*

**N**ianbo Dong, Ph.D., laughingly acknowledges PowerUp! — a software suite of educational power analysis tools he has continued to expand since the original tool launched nearly a decade ago — is best suited for the grant-writing phase of research.

In the academy, where a researcher's number of citations provides one measure of scholarly success, PowerUp!'s utility makes it somewhat uncitable.

"Some researchers submit the proposal with power analysis, they receive the grant, do their analysis, and then write the article without power analysis," said Dong, the Kinnard White Faculty Scholar in Education.

"I joke with my collaborators, 'Is this work worth continuing?'" Dong said regarding its relative uncitability.

Of course, his joke is rhetorical. PowerUp! is near essential in some avenues of educational research.

Cited or not, Dong said he is certain PowerUp! continues to help educational researchers work more efficiently and confidently. As of February 2023, Dong said

**The Edge:** Educational research that takes a quantitative approach must account for an array of factors that help to secure the integrity of a study's findings. As those factors have added complexity to analysis process, Nianbo Dong, Ph.D., and a network of researchers have worked through the challenges data present and, in some cases, created new tools enabling educational researchers to move more quickly and confidently through the research process.

the software's website had been accessed more than 12,000 times. And despite PowerUp!'s lopsided advantage in the early stages of research, Dong's first peer-reviewed article featuring PowerUp! published in the *Journal of Research on Educational Effectiveness* in 2013 has garnered more than 220 citations.

PowerUp! aids researchers in planning a range of experimental and quasi-experimental study designs, providing invaluable, time-saving tools to estimate the statistical power of their research design. In other words, PowerUp! near immediately helps scholars determine the likelihood of finding meaningful results in their research.

In 2013, Dong and Rebecca Maynard, Ph.D., a faculty member at the University of Pennsylvania,

created PowerUp! with individual random assignment designs, hierarchical random assignment designs (2-4 levels), block random assignment designs (2-4 levels), regression discontinuity designs (6 types), and short interrupted time-series designs in mind.

In any of those cases, a researcher enters a minimum detectable effect size and immediately knows the sample size needed for that research project. They can also do the opposite: enter a sample size to see the minimum detectable effect size.

And PowerUp! does all of this while considering key factors associated with statistical power and minimum detectable effect sizes, including the level at which treatment occurs and the statistical models (e.g., fixed effect and random effect) used in the analysis.

Since that original launch, Dong and collaborators — Ben Kelcey, Ph.D., and Jessaca Spybrook, Ph.D. — continued to grow the suite of PowerUp! tools— all at no cost to users.

In 2016, they launched PowerUp!-Moderator and PowerUp!-Mediator, to detect moderator and mediator effects, respectively, in cluster randomized trials.

In 2019, the PowerUp! lineup expanded to include PowerUp!-CEA, a tool to calculate statistical power in multilevel randomized cost-effectiveness trials.

The deep methodological and statistical understanding that underpins PowerUp! has helped Dong and colleagues to generate external funding from the National Science Foundation (NSF) and U.S. Department of Education's Institute of Education Sciences (IES), which has led to new educational research methodologies.

But creating new, better, rigorous methodology and tools like PowerUp! are just half of the story when it comes to Nianbo Dong's work.

### Advanced methods for the greater good

When talking with Dong about his methodology work, he quickly interjects to clarify: "applied methodology."

Which leads into the other half of his scholarly output: the application of methodologies, sometimes those of his own creation, to answer complex questions — questions that move beyond superficial research findings, questions that seek deeper meaning and understandings, questions asked to ensure that every student is considered in educational research.

"I know education is a key factor for changing someone's life, to change their socio-economic status," said Dong, a first-generation college student who began his career in higher education supporting students. "Now, I want to know what a program or an intervention can do to change a person's life by

providing good education."

One recently published work — a paper titled "Gender, Racial, and Socioeconomic Disparities on Social and Behavioral Skills for K-8 Students With and Without Interventions: An Integrative Data Analysis of Eight Cluster Randomized Trials" that appears in *Prevention Science* — pooled data from eight IES-funded cluster randomized trials to address research gaps regarding social and behavioral outcome disparities in elementary and middle school students.

Dong and his team ultimately found that significant gender, racial, and socioeconomic disparities existed in social and behavioral outcome measures — including concentration problems, disruptive behavior, emotion dysregulation, family involvement, family problems, internalization, and prosocial behavior. The discrepancies — the largest of which varied across schools — could be reduced by interventions and favored students who were female, ineligible for free or reduced-price lunch, and White.

A succinct, definitive conclusion that can inform future research, the creation of more effective interventions, policies, and more is the whole point of scholarly research. But that succinctness of the findings belies a process that's equal parts creative, analytical, labor intensive, and rigorous.

In the ways of quantitative methodology, integrative data analysis (IDA) is a fairly recent addition to a researcher's toolkit, first appearing in *Psychological Methods* in 2009. In that publication, Patrick J. Curran, Ph.D., and Andrea M. Hussong Ph.D., both UNC-Chapel Hill professors, defined IDA "as the analysis of multiple data sets that have been pooled into one." They wrote that "both quantitative and methodological techniques exist that foster the development and maintenance of a cumulative



**Nianbo Dong**

Kinnard White Faculty Scholar in Education

knowledge base within the psychological sciences" and pointed to meta-analysis as the best tool to achieve that knowledge base at the time.

But where meta-analysis allows for the synthesis of statistics drawn from existing studies, IDA draws from original data sets — enabling deeper statistical analysis within a massive, aggregated data set.

Since 2009, the use of IDA has radiated outward from psychology and across a number of adjacent fields, including education.

In Dong's study, the eight previous IES-funded cluster randomized trials provided data from more than 90,000 kindergarteners through eighth graders in 387 schools in Maryland, Missouri, Virginia, and Texas. Each of those trials was selected for IDA because they evaluated the effectiveness of school-based prevention interventions and used the same outcome measures. Most of those projects involved a 2-day teacher training. Some followed that with additional coaching. All eight included a primary outcome of teacher reports of students' behavior using the Teacher Observation of Classroom Adaptation-Checklist (TOCA-C; Koth et al., 2009;



Werthamer-Larsson et al., 1991).

As one might imagine, bringing together data in those quantities takes a great deal of time and attention. In IDA, the reconciliation of disparate or incongruous sets of raw data is a process known as “harmonizing.”

But the work put into harmonizing data pays off, enabling researchers, Dong included, to draw big conclusions about programs and interventions and, more importantly, their effects on students according to a number of demographic identifiers.

In this recent study, Dong and his collaborators provide empirical evidence that indicates significant disparities in multiple social and behavioral outcomes for students between females and males, White and Black, White and Hispanic, and eligible and ineligible for free or reduced-price lunch — in both the control and treatment groups. Their analysis accounts for the random effect of students being nested in school; for example, the outcomes disparities of Hispanic students in one school will likely differ from Hispanic students in another school compared to White students.

Ultimately, the study affirms decades of concern regarding disparities in educational outcomes for students of color and students of low socio-economic status. But it also provides insights into the effect... Does an intervention have a different effect for a Black student? A Latino student? A female student? A student who receives free or reduced-price lunch?

This kind of approach also enables researchers to understand the outcomes for underrepresented groups in research. For example, a previous study may not have yielded enough Latino participants to draw significant or even accurate conclusions about outcomes for those students. By combining similar studies, IDA has the potential to unlock new, urgent understandings within existing data.

In the almost decade and a half

since IDA came onto the academic scene, governmental grant-making agencies have added the practice to their funding priorities. IES, NSF, and the National Institute for Mental Health are notable examples. And for good reason. Studies like Dong’s provide important implications for a range of audiences, including policymakers, fellow researchers, practitioners, and more.

In the case of Dong’s most recent study, the disparities reported in the study’s findings can expand educational researchers’ understanding of the current status of gender, racial, and socioeconomic disparities on social and behavioral outcomes for K–8 students. The findings also point to the impacts of interventions on improving social and behavioral outcomes for all students and reducing disparities. Additionally, the disparities found can serve as empirical benchmarks for interpreting the effect sizes of interventions found in future research.

### The most rigorous methods possible

To develop new methodologies and tools, Dong said he listens to colleagues to understand limitations and challenges faced and where gaps in literature exist.

“My research ideas come from practical needs,” Dong said. “In those needs, I also look for the potential to generate new knowledge that can have big impact.”

Those astute observations have meant funders like IES and NSF invest, and continue to invest, in Dong to develop new, rigorous evaluation methods, particularly around randomized control trials.


In current research funded by NSF, Dong is creating a statistical framework and tools to plan multi-level randomized cost-effectiveness trials, including moderating and mediating effects in addition to the main effect, specifically with regard to STEM education.

As the need for effective

STEM education programs, policies, and practices have grown, so has the demand for comprehensively assessing their cost-effectiveness. Dong envisions more comprehensive assessment tools that detail not just the effects of STEM programs but also the net cost of producing those impacts across the many organizational levels — such as classrooms, schools, and districts — critically enhancing STEM cost-effectiveness studies by estimating and separating costs across levels.

Recently, Dong collaborated to develop statistical methods and a user-friendly tool to help researchers plan cluster randomized cost-effectiveness trials (CRCETs), which involve the random assignment of entire clusters to a treatment or control condition to evaluate the cost and effectiveness of an intervention. While CRCETs aren’t new, no tools exist to support that line of inquiry.

“We always want evidence-based policy and interventions,” Dong said. “To generate this, we need better tools.”

Dong is always in pursuit of those tools, methods, and areas of application to help solve education’s most complex challenges. 

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# Rethinking education beyond grades

*Ethan Hutt's new book, "Off the Mark: How Grades, Ratings, and Rankings Undermine Learning (but Don't Have To)," provides insights into the history of assessment and how schools can better utilize them to promote student success without compromising teaching or learning.*

**A** new book co-authored by Ethan Hutt, Ph.D., Gary Stuck Faculty Scholar in Education, examines the historical origins and impacts of today's academic assessment system, focusing on grades, testing, and transcripts.

In "Off the Mark: How Grades, Ratings, and Rankings Undermine Learning (but Don't Have To)," published by Harvard University Press, Hutt and co-author Jack Schneider, Ph.D., an associate professor in the School of Education at the University of Massachusetts Lowell, draw on their expertise as historians of education to explore how grading systems can work to better assess what a student learns and can do — with the goal of helping educators cultivate high-quality learning experiences.

Hutt, who serves as program coordinator for the School's Minor in Education, conducts research centered around the quantitative measures utilized to describe, define, and evaluate American schools. His work seeks to understand where these metrics come from, how

## The Edge:

Ethan Hutt's research focuses on the numbers we use to describe, define, and evaluate American schools, and often takes an historical approach that emphasizes the role of law and policy in shaping these developments.

they became central to the work of schools, and the effects they have on how people think about what schools do and how well they do it.

In the book, the co-authors also feature ways that assessments can be improved to motivate students, imploring readers to have meaningful conversations about the role of assessments.

*In the following Q&A, Hutt discusses the book's objective and proposes methods to enhance the grading system for a more accurate evaluation of a student's knowledge and abilities — while promoting lifelong learning.*

## What motivated you to explore this topic and dedicate a full book to it? And why now?

We wanted to write a book on grading, testing, and transcripts because they are ubiquitous in schooling at all levels. Grading and assessment are an important part of the lived experience for both students and teachers. While teachers may think about sharing favorite texts and fostering learning, they also spend a great deal of time on grading and communicating with parents. These assessment practices deeply shape teaching and learning, so we felt it was important to critically examine them.

In the first part of the book, we provide a description of current assessment practices and, crucially, a history of how these assessment practices developed over time in response to specific challenges in the school system. Our aim in providing this history is to help people see these practices in a new light. There is nothing about our current practices and that status quo that is inevitable. Our motivation is to improve our education system so that it

facilitates learning. The pandemic especially has led to rethinking many aspects of schooling. It seems like the perfect time to critically examine something so fundamental as how we assess, communicate, and memorialize student learning. We always need to grapple with these core pieces of education, and a book seems like an important way to spur that conversation.

The assessment tools we use shape teaching and learning in profound ways, so it's important to explore where they came from, why we use them, and consider alternatives. Our book aims to spur that kind of critical reflection on these assessment tools that have become accepted as just part of education.

### **How are grades, ratings, and rankings hindering learning and creating inequality now?**

A major challenge is that grades, tests, and transcripts have become the focal point of our system, rather than a supporting tool. We want these technologies to simultaneously motivate students, focus student attention, and communicate achievements, but the pursuit of high marks has swamped the learning itself. There is an unhealthy intensity around grades versus the work behind them. This imbalance strains the system, and teachers feel it when students frequently ask about test material or push to regrade assignments.

The disconnect is that grades and tests have become the focus rather than signifying learning. When accumulating points and scores takes priority over acquiring knowledge, something has gone wrong. We don't argue for eliminating assessment. That's unrealistic. Teachers need to evaluate and communicate about the quality of student work, but we can better align our goals for actual learning and motivation with our need to give and record evaluations of that learning.

The solution is not getting rid of grades but restoring balance

— keeping learning at the forefront.

### **What are some of the ways grades, ratings, and rankings can support learning?**

Assessments can support learning when aligned with our educational goals. One distinction we make is between students pursuing good grades on assignments that are substantive and meaningful versus those they accumulate just because they have completed assignments.

There is nothing inherently wrong with students trying to excel if the work behind the grade provides valuable skills and experiences. But in too many classes, a lot of work is done just to get scores and grades, not for its inherent value. We should aim to create assignments where students earn grades through experiences that enrich their learning and development. Then, grades motivate striving for growth and outcomes that benefit students beyond just accumulating specific scores. The solution is realigning classroom work so that grades come from meaningful tasks, not busy work for scores alone.

To give one concrete example, one argument we make is that students should be able to make their grades "overwriteable" —that is, to allow them to erase and overwrite their grades. Sometimes people push back and argue that assignments are not worth redoing and that they are ephemeral. But then we should ask whether the assignment was worth doing at all. If we consider how work is produced in most professional settings, we know that in these settings the first attempt is rarely the final product. You submit work, get feedback, rework it, consult with others, and iterate. So, the idea that assignments should have value beyond a course and be worth reworking requires a reorientation of how we approach them.

Especially as students get older, we sort of recognize the importance of bringing our assignments in line with the next step that they're



**Ethan Hutt**  
Gary Stuck Faculty Scholar  
in Education

taking. And this is high-level skills like writing, but it's also professional skills. For instance, if a student decided to take an accounting class, a professor can say, "Hey, if you go and become an accountant, this is what you have to be able to do." We can make that truer than it is in a lot of cases in our classes and all the way through. This is a good instance where we can feel good about grading and assessing because we know that the work is being done toward something meaningful.

### **How do you envision your book contributing to the ongoing conversation about education policies related to student support and assessing student progress?**

Our goal is to spark a conversation that allows for sharp thinking about how we can improve our schools and better serve our students.

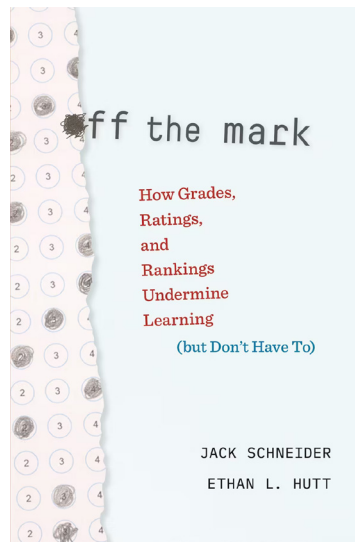
In my personal experience, understanding the origins and evolution of something helps me grasp when its original purpose has become misaligned with our current practices over time. Examining this history allows us to thoughtfully assess what is still working, what needs updating, and what new approaches might serve us better today.

Our goal is to spark a conversation that allows for sharp thinking about how we can improve our schools and better serve our students.

I think providing history in some context can be liberating. It can help people understand why we do things the way we do and then open space for having conversations. The other thing we want is to cultivate a language around some of the purposes and functions. We spent a fair bit of time in the book trying to explain to people why, in our view, a lot of efforts to reform grades, testing, and transcripts have not worked in the past. One of the reasons is that people have not had a clear way to describe the many functions that grades and tests serve in our school system and our society. Another reason is that people have looked at only one of these functions, tried to fix it in isolation, and hope everything else would just work itself out. Our argument in the book is that because grades, testing, and transcripts are deeply intertwined with each other and with a range of school, social, and professional outcomes, we have to consider them together. We will only succeed in reforming them if we grapple with the complexity, not ignore it.

We want to invite people to think about how we can accomplish meaningful goals. For example, "How can we create assignments that have real-world value and meaning for students?" and "How can we lower the stress levels by allowing students multiple attempts at assignments, since we know they start at different levels?"

As someone with family members



who are educators, I envision teachers gathering over the summer as they prepare for the new school year. They could have conversations framed with inviting language that positions them as experts on their schools, students, and classrooms. With the proper tools and terminology, they can explore how to handle challenging moments productively.

**What do you hope readers take away from the book, and what impact do you hope it has on education broadly?**

I hope that the book provides people with a language for talking about this challenge in a way that doesn't simplify it and doesn't force a solution. If we aim to balance the system, it's important to make things better for our students and teachers. It's going to be a collective

and collaborative effort, and people at every level need to think through all aspects of assessments and student success measures.

The best thing that I'm hoping will come from the book is that we will have provided a language to have deep and meaningful conversations around this by identifying the purposes that these assessment technologies serve.

**Are there particular areas you believe still require more attention and exploration?**

One area where we need to focus on giving more care to is having more conversations. This book should serve as an impetus for thinking about how changes in one aspect of education, such as testing or student success, can have acute effects in other areas.

The pandemic highlighted for many people the need to balance our education system, as students face pressure not just in their choice of school, but in the way they feel about their education. It is important to ensure that students have the space to grow and develop, without being overwhelmed by anxiety and scores.

We see this as an ongoing process of balancing, requiring multiple attempts to engage, and motivating students while communicating new innovations to schools and admissions offices. I am committed to doing the work and thinking through it with others. ✨



# Empowering the next generation of STEM professionals

*Jill Hamm, Ph.D., William C. Friday Distinguished Professor of Education, has spent her career working to understand the social dynamics of middle and high schoolers and how those dynamics can help teachers to deliver better instruction inside the classroom. Her most recent research promises to provide BIPOC middle and high schoolers with an interactive simulation to help grow their collaboration skills and explore possible STEM career fields.*

Jill Hamm, Ph.D., says she never could have imagined writing “screenplays” nearly 25 years ago, after earning her doctorate in educational psychology and launching a research agenda that still seeks to understand the peer social dynamics of adolescents inside and outside classrooms.

But here she is with three screenplays to her name. They aren't bound for Hollywood or big screens. Rather, Hamm's 50-page scripts are bound for computer and tablet screens with the goal of providing BIPOC middle and high school students with digital learning experiences that help them grow their skills as STEM problem solvers and collaborators.

When fully realized, Hamm's scripts will provide those students — in informal and after-school learning settings — with interactive simulations that place them in archetypal STEM organizations working with an avatar as their partner to collaboratively solve an authentic problem faced by STEM professionals. One simulation challenges students to use data in the development of a community greenway. Another places them in a virology lab. The final simulation brings together artificial

**The Edge:** Hamm's research interests center on early adolescents' social, behavioral, and academic adjustment, and the role of peer relations in successful school adaptation.

intelligence and business analytics in a hospital setting.

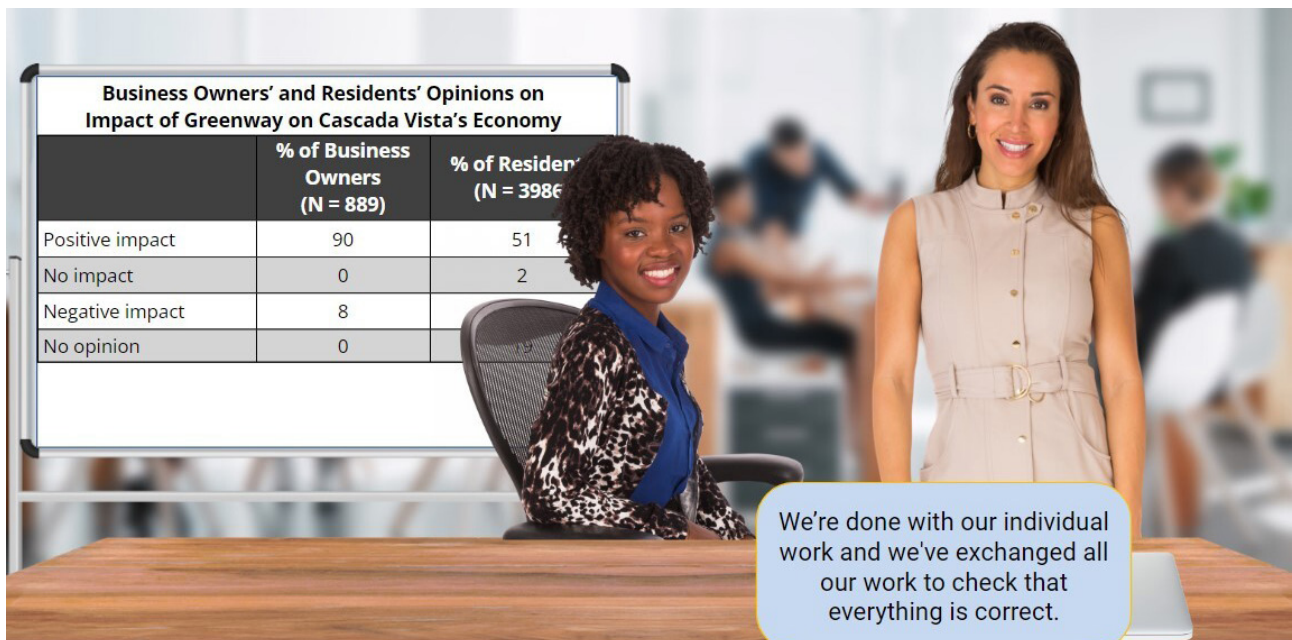
Ultimately, Hamm and her collaborators aim to provide students with critical skills in collaboration, skills that serve them in small group learning environments in STEM classrooms now and in their future education and careers.

Throughout the simulation, students also receive mentorship from virtual STEM professionals — based on actual professionals from backgrounds underrepresented in STEM careers, who shared stories of their personal journeys into those careers. Hamm



**Jill Hamm**  
William C. Friday Distinguished Professor of Education

simultaneously hopes to provide students who play the simulation, many of whom would be first-generation collegegoers, with the possibility of an unknown or unconsidered career pathway. According to 2021 data from the National Science Foundation (NSF), Hispanic workers represent 15% of the total STEM workforce, and Asian



An image from one of the simulations in the Collaborative Activities in STEM Careers for Adolescent Engagement (CASCADE) study.

and Black workers are 10% and 9%, respectively.

The three simulations are part of CASCADE — or Collaborative Activities in STEM Careers for Adolescent Engagement — a study with Horizon Research Inc., funded by a \$1.5 million NSF collaborative research grant. Hamm's husband, Daniel Heck, Ph.D., vice president at Horizon Research Inc. and a mathematics education researcher, is also a principal investigator for CASCADE.

In addition to working with Horizon Research Inc., a Chapel Hill-based company founded by alumna Iris Weiss ('75 Ph.D.) in 1987 to improve STEM education efforts through research, Hamm is working with school counseling faculty member Robert Martinez, Ph.D., to ensure the scripts embed invaluable messages of cultural capital, especially in simulations for Latino students.

To create the actual simulations, she's working with Robert Hubal, Ph.D., a research scientist at RENCI (Renaissance Computing Institute), and with UNC Digital and Lifelong Learning. To deliver these simulations, she is working with strategic community partners including UNC's Morehead Planetarium and Science Center, who work to provide college and career readiness and pathway programs for youth.

"This is a project I never could have dreamed of when I was just beginning my career," said Hamm, William C. Friday Distinguished Professor of Education, "but with decades of research around social dynamics and small-group learning coupled with really incredible stories and journeys of individuals within STEM fields and a recent collaboration in informal learning environments, this really is a dream project for me."

### Supporting peer dynamics for academic success

When Hamm graduated with a Ph.D. from the University of Wisconsin-Madison, she envisioned a career focused on understanding peer relationships and the factors that contribute to and support those relationships. With her doctoral advisors and after graduating, she worked within datasets from nine high schools in Wisconsin and California, studying the friendships of adolescents from diverse racial and ethnic backgrounds.

As a postdoctoral fellow, Hamm's work zoomed in from the school level and into math classrooms, studying students' authority within classrooms and how math teachers distributed power to students. When she arrived at Carolina in 1999, her interests in peer relationships and classroom instruction quickly converged. She served as co-PI

on an NSF study in which she focused on how students' sense of belonging and peer norms regarding effort and achievement evolved in middle school math classrooms in relation to the classroom environment.

Soon after, Hamm began a long-running research collaboration with then-Carolina faculty member Thomas Farmer ('89 M.A., '94 Ph.D.), now at Virginia Commonwealth University, that remained focused on the classroom but refined her work, recognizing the impact of teachers on social dynamics and academic success.

Hamm joined the National Research Center for Rural Education Support — funded by the Institute of Education Sciences (IES) and led by Farmer and then-Carolina faculty member Lynne Vernon-Feagans, Ph.D. — and she and Farmer launched the Rural Early Adolescent Learning Project (Project REAL), developing and implementing professional learning experiences for teachers in rural schools across the U.S. Those learning experiences supported early adolescent social, behavioral, and academic adjustment.

This work was grounded in part in a concept introduced by a Farmer-led team, of the teacher as an "invisible hand," then an understudied concept which posited teachers had the potential, sometimes intentionally





This is a project I never could have dreamed of when I was just beginning my career.



but often without their awareness, to influence children's peer relationships and their broader adjustment in school.

Hamm's work with teachers went further and focused, in part, on the idea of teacher attunement, conceptualized originally by achievement motivation scholars as a critical aspect of teacher involvement with students. In a 2011 article published in the *Journal of Applied Developmental Psychology*, Hamm applied the idea of attunement to classroom social dynamics, asserting that teachers' attunement to or accurate awareness of students' peer group affiliations was an important means of promoting a classroom peer culture characterized by positive, productive student relationships.

Hamm and colleagues found that with professional development, teachers could improve their attunement to students' peer relationships, and subsequently improve students' sense of classroom belonging. More broadly, Hamm and colleagues found that students' social dynamics in classrooms of teachers who completed the Project REAL professional development became more productive as compared to similar classrooms of teachers who did not take part in the program.

Detailed in *Developmental Psychology*, Hamm and colleagues found that peer group norms were more supportive of effort and achievement, and that achievement and effort had greater social value with peers in classrooms of teachers who completed the Project REAL professional development. Students in Project REAL classrooms viewed their academically engaged peers as "cool," more so than compared with students in classrooms in which

teachers did not complete the training.

With an additional \$4 million in IES funding, Hamm and Farmer built upon Project REAL and created Supporting Early Adolescents' Learning and Social Success (SEALS), providing teachers in 26 metropolitan schools in the southeast with knowledge and tools to support positive peer cultures around academic effort and achievement within their classrooms.

### The leadup to CASCADE

In 2014, Hamm built on her work on classroom social dynamics and interest in mathematics classrooms, collaborating with Heck and launching a \$1.5 million, NSF-funded project, PEARL — Peers Engaged as Resources in Learning.

Research at the time found that small group work occurred in 70% of middle grades mathematics classrooms at least once a week, and on average, accounted for 25% of instructional time in those classes.

The need for student opportunities to engage and persevere with meaningful and challenging mathematics problems, and to take active and collaborative roles in problem solving, was and continues to be critical. Yet, effective group work can prove challenging. Students disengage from difficult tasks and find it difficult to talk about their mathematical thinking. Students' social concerns over their peers' perceptions — if they appeared too interested in the content or not capable enough to complete the work — often limit their willingness to learn from one another.

The 5-year collaborative grant enabled them to go inside middle and high

school math classrooms and observe students and teachers. PEARL involved a carefully sequenced set of research phases that included classroom observations, interviews, and surveys with teachers and students regarding mathematics small group work in both naturalistic settings and designed conditions to develop and test both a framework for understanding small group learning and strategies to help teachers support successful group work. Results of the study are informing teacher preparation and ongoing education, mathematics teaching practice, and educational research.

PEARL has yielded a new model for peer engagement in groups. The team designed tasks with embedded pointers to help students get started and make progress, and provided mathematically meaningful roles so that each individual student made specific contributions and was accountable for the group's solutions. Student materials included prompts to guide help-seeking and help-providing, so that students could use each other effectively and respectfully as resources, rather than calling for the teacher with every question or devolving into unproductive interactions.

"We created really strong deliverables for teachers and students," Hamm said, "but in the midst of rolling out these 'group worthy' tasks, we quickly realized that students needed opportunities to practice how to work in groups, how to productively and successfully collaborate."

At that point, the PEARL team devised the idea of an interactive simulation that could help students learn to collaborate and practice their collaboration skills. But in the midst of the Covid-19 pandemic, offering the simulations in

classroom had grown difficult.

## Unexpected collaborations

Early in Hamm's tenure as the School's associate dean for research and faculty development, a position created by Dean Fouad Abd-El-Khalick in 2017, a meeting with Todd Boyette, Ph.D., executive director of the Morehead Planetarium and Science Center on the UNC-Chapel Hill campus, would push her research interests beyond classrooms and schools.

"Todd wanted a stronger relationship with the School in terms of research," Hamm said. "He also wanted to pursue NSF funding around advances in informal science learning and to do so in collaboration with School faculty members."

Hamm connected Boyette with Janice Anderson, Ph.D., a School of Education associate professor whose work has sought to engage both teachers and students in the use of new and emerging technologies in the teaching and learning of science, and in 2019, Hamm and the team, which includes Crystal Harden ('93 M.A.T., '21 Ed.D.), Morehead's director of program and inclusion initiatives, won a \$2.86 million NSF grant to develop exhibits and programs illuminating world-changing scientific contributions by BIPOC scientists.

The project, called "Hidden No More: Shedding Light on Science Stories in the Shadows," continues to engage Morehead visitors with innovative learning resources including transportable, interactive exhibits focused on light: how humans perceive light, sources of light from lightbulbs to stars, uses of real and artificial light in human endeavors, and past and current STEM innovators whose work helps people understand, create, and harness light now.

Exhibits explore the characteristics of light — color, energy, time — in multiple ways: short documentary and animated films, virtual reality experiences, interactive "photoboosts," and technology-based inquiry activities. Morehead staff have also taken these experiences on the road to rural North Carolina and to many partner sites across the U.S.

Hamm and Anderson have provided expertise and insights on exhibit narratives and activities, and are studying how middle school students engage with and learn from the exhibits.

"This is a really fascinating project that has taken me and my work in ways I never would have gone," Hamm said.

## Inspiring future STEM professionals

With "Hidden No More" and her prior work on social dynamics in mathematics classrooms, in mind, and set against the backdrop of a global pandemic, CASCADE began to take form.

Thinking about the work with Morehead, Hamm and Heck re-imagined the simulation to practice collaborative learning outside of school settings.

And when NSF put out a request for proposals for its Innovative Technology Experiences for Students and Teachers (ITEST) program — a request that challenged applicants to leverage technology in students' STEM learning and help to inspire the next generation of STEM professionals from a range of backgrounds — Hamm and Heck saw a new way to teach adolescents in college and career pathway programs how to work in groups. Building on PEARL, their proposed simulations would incorporate opportunities to practice collaborative skills with a virtual partner, working on authentic tasks arising in STEM careers such as engineering, computational chemistry, and artificial intelligence. The simulations would also feature the stories of real STEM professionals from groups historically underrepresented in these fields and the teamwork they undertake each day. CASCADE naturally fell into place.

"When you start working on a project, sometimes it takes on a new shape, some of it is anticipated," Hamm said. "I don't think we could have predicted the incredible partnerships with STEM professionals and strategic partners that have been foundational to this project."

The powerful stories they heard — ones of adversity and ultimately success — from BIPOC STEM professionals are threaded into the simulation storylines in engaging ways. As students move through the collaborative work challenges in the simulation, they hear career feedback directly from these professionals. Moreover, in short podcasts they hear how these professionals have navigated their journeys into and through a STEM career. Hamm hopes those stories, combined with the other simulation elements,

will inspire today's students to see themselves as effective collaborators in STEM careers.

Later this year, Hamm and her collaborators will share CASCADE's first module and those powerful stories, and subsequently her first screenplay, with the next generation of collaborative STEM professionals.

*The CASCADE and the PEARL research projects were funded by the National Science Foundation through grants to Jill Hamm, Ph.D., and Daniel Heck, Ph.D. Heck and Hamm are married, and Heck is employed by and a co-owner of Horizon Research. The University of North Carolina at Chapel Hill has reviewed these arrangements and concluded that the possible benefit to Heck or Hamm is not likely to affect participant safety or the scientific quality of the study.* ✨

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# Educating generations of professionals serving children with disabilities

Over the last 25 years, Harriet Able, Ph.D., has continuously secured professional development grants from the U.S. Department of Education's Office of Special Education Programs (OSEP) to equip master's and doctoral students at the University of North Carolina at Chapel Hill with the necessary skills and knowledge to effectively serve young children with disabilities.

Since 1998, Able — a professor who has been with the UNC School of Education since 1993 — has applied for and received 14 of these grants, totaling more than \$12.5 million in funding.

Of those 14 grants, nine provided support and training for master's-level students — between 30-40 students per grant. Five leadership grants focused on doctoral students. Over the course of one leadership grant, usually five years, six students earned their Ph.D. And each of those grants took an interdisciplinary approach, funding students not only in education but students from allied health professions — occupational therapists, speech and language therapists, child psychologists.

The total impact of Able's grants is hundreds of graduate students who were able to learn from experts in child development, special education, allied health, and more. They were taught evidence-based practices, with a focus on family centered and interdisciplinary services. Grant-funded students received full tuition support, health insurance, and stipends.



**Harriet Able**  
Professor

And when they left Chapel Hill, they entered communities across North Carolina and the country carrying Able's approach with them, to serve children with disabilities and their families.

## Recognizing the needs of dedicated educators

Long before pursuing a Ph.D. and joining the academy, Able was a new special education teacher on South Carolina's barrier islands. She worked with members of the Gullah and Geechee communities, descendants of enslaved people brought to the Lowcountry from central and west Africa.

Because of the islands' isolation, change has come slowly, allowing the communities to hold on to cultural traditions their ancestors brought from their homelands. It has also meant that access to services has been limited.

At just 21 years old, Able visited family homes of children with disabilities. Though she was well trained as a teacher, she realizes now that she didn't know how to relate to families that looked different from hers. She hadn't been trained in that.

"I learned so much from those families," Able said. "I came to understand the need for continuous, up-to-date knowledge about best practices. If we are working with children and families, we owe them the very best interventions that are research-based."

Able's next career step took her to the Colorado Department of Education, where she conducted technical assistance training for teachers and allied health professionals — speech and language therapists, occupational therapists, nurses, and school psychologists — who work with young children with intellectual and developmental disabilities.

She learned about OSEP grants while earning her doctorate at Vanderbilt University. She was the recipient of one.

"I was fortunate because my doctoral education was funded on one of these leadership grants," she said. By enabling her to focus solely on her doctoral training, the grant enabled her to delve deep into research, explore innovative ideas, and engage in meaningful collaborations with scholars and experts across fields.

"When I got out of school, I didn't owe any money. It really was a gift," she said. "So, when I graduated and

went into higher education, I felt obligated to write these grants to support practicing professionals.”

### Serving special educators and the field(s)

Jessica Amsbary, Ph.D., program coordinator for the School’s Master of Education for Experienced Teachers program whose students, working early childhood educators, benefit from the grants, called Able “a brilliant genius” at securing funding.

“She knows what she needs to do,” said Amsbary a former advisee of Able. “The result is, educating and supporting students who go on to be strong, inclusive advocates, strong advocates for children with autism, and highly skilled educators and researchers.”

To ensure a robust data set when applying for a grant, Able cultivates and maintains relationships with students as they make their way through their programs.

“A big piece of it comes from her personal connection with students,” Amsbary said. “She stays in touch with them throughout their time in the program. She has the data and the information to prove that they are benefiting, that they’re learning, that they’re making a difference. Then she stays in touch as they continue their careers, so she has follow-up data to add to grants moving forward.”

The research outcomes of this long stretch of work center on interdisciplinarity. In a 2017 article for *Infants and Young Children* that was among the journal’s most-read that year, Able and co-authors conducted an extensive focus group study with an interdisciplinary group of early intervention professionals serving young children birth to age five. Focus group members shared dilemmas they experienced related to family-professional and interprofessional conflicts as well as ones related to policy and administrative issues. From that, Able expanded a framework for systematic ethical reflection and problem-solving based on her earlier research focused on ethics and decision-making in health care for

young children with chronic illness and disabilities.

“It’s important that my work is translational, that research findings are applied to practice, and practice questions are incorporated into future research,” Able said. “My goal is to make my research accessible, relevant, and useful to families and teachers of young children and youth with disabilities. Interdisciplinary collaboration has been the keystone of my work because that is how professionals must interact when best servicing children and youth who have disabilities and their families.”

Able has published close to 50 journal articles and given about 100 presentations, but among the things she is most proud of is leading the development of the undergraduate Child Development and Family Studies program at Carolina, which has evolved into the Human Development and Family Science program that enrolls 300+ undergraduates each year.

“When I teach undergraduates, I always have students do what I call a family internship. They go into homes and experience routine family life, and then do some service for a family,” she said. “It’s just important in order for us to be empathetic caregivers, to be able to put our feet in the shoes of someone else. All families are different.”

### Centering family needs

Able learned the value of a family-focused framework during her time in South Carolina. She also gained the insight that what proves effective for one family may not be feasible for another.

She recalled working with three-year-old twin boys with cerebral palsy. Able and fellow teachers wanted the children to learn to walk so they could be independent, but the family would bring them to school, carrying them like babies. Able decided to make a home visit, thinking she would have dedicated time to do therapy with the twins.

At the home, she discovered the boys were being raised by their grandmother and that she was

raising three other children under the age of eight. Still, the grandmother welcomed Harriet with a slice of chess pie and a glass of sweet tea. They always had a visit on the front porch before she got to work with the boys.

“I hadn’t been trained to relate to grandmothers or family members that were a lot older than me, and that were culturally different from me,” Able recalled. “I tried to be the teacher with them, and that didn’t work. What did work was to use my relationship-building skills, to learn about their family.”


Able realized over time that the best way to work with the twins, or any child, was to understand their family’s values and priorities. “That was a big lift for me,” she said.

Able has worked ever since to ensure that it isn’t a big lift for professionals who work with families of children with disabilities. All families are different. Family engagement, or family involvement, is always on a continuum.

“One family that is very engaged might have a strong advocate, who has all the resources and comes to all the meetings ready to go,” she said. “But another family is equally engaged and involved if they get their children up, dressed and fed before school. That has always been something I’ve tried to keep in mind and to instill in my students.”

The ability to center a family needs to be shared by all the professionals that may interact with them on behalf of a child with disabilities. This is why Able’s grants include comprehensive training opportunities with and in collaboration with allied health professionals.

“Families with children with disabilities are inundated with paperwork, multiple professionals, and multiple resources,” Able said. “That’s why the core of what I’ve done has been interdisciplinary.

“The seamless services and supports for these families begins with strong collaboration among the disciplines.” 

# Our Purpose

**The UNC School of Education  
is an institution of innate quality  
and profound impact.**

Through curriculum, instruction, research, field experiences and clinical practice, we are preparing students for the leadership roles they will assume in education. From the moment we were founded in 1885 as one of the first professional schools established at the University of North Carolina at Chapel Hill, we have been supporting students and families in our state and across the nation.

# Our Promise

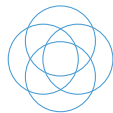
**Our mission is to ensure that every  
student has the opportunity to reach his  
or her maximum potential as an individual.**

We recognize the promise of every child, and educate through holistic, strategic methods. We educate the next generation of teachers, administrators and professionals to be leaders at all levels. With our influence on education we can lift every member of society, and that is the mission that motivates us every day.

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